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STEEL

ESTABLISHED 1882

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STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views the News

■ STEEL production moved up another point last week (p. 27) to 93 per cent of ingot capacity, marking another all-time tonnage record. Another spurt in demand may result from repeal of the arms embargo; in fact, some evidences of such a trend (p. 27) already have manifested themselves. This will come from domestic manufacturers of trucks, airplanes, machine tools and other products ordered from abroad. Steel export demand is heavy and growing; such exports (p. 42) were 32 per cent higher in September than in August. Some producers (p. 30) are not accepting any export business. In general (p. 81) there is no letup in pressure on the steel mills for deliveries, and first quarter order backlogs are growing despite absence of assurance as to first quarter prices.

• • •

Collective bargaining procedure at Chrysler plants, say company officials (p. 37), is used as a "racket" to keep them in constant turmoil for the purpose of strictly union activities; the slowdown has been extended and many thousands of incomes have been paralyzed. . . . General Motors technical experts (p. 38) regard plastics as well adapted for insulation and decorative purposes but not for structural parts. They see little possibility of the substitution of lighter metals for steel in automobile bodies. . . . One automobile builder (p. 38) now offers a complete winter and summer air conditioning system as a standard, factory-installed, extra cost accessory. . . . Court procedure may be instituted (p. 32) to determine constitutionality of the administration's trade agreements program.

Collective "Racket"

• • •

Minimum weekly wages for workers engaged in the manufacture of small arms and parts, ammunition and explosives (p. 32) are announced by the secretary of labor. . . . Aggregate third quarter net earnings of 18 steel companies representing 89.3 per cent of the capacity were $29,289,843, an increase (p. 30) of 142.5 per cent over the second quarter. . . . Aside from seasonal accumulation of iron ore and other stocks, United States Steel Corp. (p. 30) has made no general increase in its inventories. . . . Iron ore price policies were investigated at last week's temporary national economic committee hearings (p. 23); steel will have its innings this week. . . . Additional orders bring 1939 freight car awards (p. 81) to the highest level since 1929.

Earnings Up 142.5%

• • •

Materials handling within the machine itself is an important factor in modern machine tools, says Guy Hubbard, STEEL's machine tool editor. "Once the machine has hold of the piece don't let it go until every possible operation has been accomplished," is the guiding principle (p. 48) of many successful machine designers. . . . New finishing processes such as lapping and shaving, together with entirely revised and improved standards of accuracy, have made it possible (p. 50) to reduce weight and cost of helical gear transmissions, while at the same time increasing capacity and life. . . . A new method of checking hydrogen ion concentration values in acid solutions (p. 53) is fast, simple and accurate, and requires no laboratory-trained operator; it employs impregnated papers.

Machine Operation

• • •

Power-accelerating toggle links (p. 54) materially improve the closing power of a new type clamshell bucket. The links also guide the scoop members, permitting a more protected design. . . . Tool steels, particularly those of the air hardening type, are bright hardened (p. 56) in a new gas atmosphere furnace. . . . Republic Steel Corp.'s new continuous tube mill at Youngstown O., has capacity (p. 59) for making 0.5-inch to extra heavy 3-inch buttwelded pipe in lengths of 1 to 45 feet; an additional similar unit will be installed immediately. . . . A research worker (p. 60) asks: Why do so many operators of pickling plants object to the re-use of recovered acid? . . . A growing trend (p. 68) is the combination of several standard pipe fittings by welding to form a special pipe fitting.

Bright Hardened

E C Kreutzberg

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RYERSON CERTIFIED STEELS

RYERSON

Monopoly Inquiry Centers on Prices;

Steelmen To Testify This Week

WASHINGTON

■ HEARINGS on the steel industry before the temporary national economic committee will be concerned primarily with prices, although other subjects also will be covered. This was made clear by Thurman Arnold, assistant attorney general, and other government agents last Wednesday.

As the investigation opened Mr. Arnold submitted a statement outlining what the government hopes to accomplish. A mass of charts and statistics were introduced. The United States Steel Corp.'s technicolor sound movie on steelmaking was shown. Representatives of the monopoly committee and the steelmen posed for pictures. These ceremonies consumed the entire morning.

Committee officials believe the hearings will last two or three weeks. Some observers, however, expect them to drag out for four or five weeks as did the oil hearings just concluded.

Sessions last week were devoted to the iron ore industry, with six representatives of ore companies testifying.

Traces Lake Ore History

Committee officials indicated steelmakers would be called this week. B. F. Fairless, H. L. Hughes and Robert Gregg, all of the United States Steel Corp., are scheduled to be early simultaneous witnesses Monday. It is expected they will discuss the corporation's pricing policy and the mechanics of establishing prices, the increases of 1936 and 1937 and the decrease of 1938, and the elimination of differentials at Chicago and Birmingham, Ala.

Prof. M. G. Dechazen, University of Virginia, also will be called Monday and will testify regarding wartime steel prices.

Elton Hoyt II, managing partner, Pickands, Mather & Co., Cleveland, in his testimony last week, gave a history of the Lake Superior iron ore industry, told the committee the district supplies about 85 per cent of United States ore.

Iron ore was known to exist in the district before 1800 but was not produced commercially until the middle of the last century. Mr. Hoyt told the committee that in 1854 a thousand tons of ore was shipped from the district.

By the end of 1938 a total of 1,700,000,000 gross tons had been shipped from the six principal ranges, indicating the growth of the steel industry.

As early as 1899, said Mr. Hoyt, some of the iron and steel companies had acquired interests in iron ore mines but to a large extent iron and steel producers relied on open market purchases. He stated that it has been estimated that the United States Steel Corp. through the Oliver Iron Mining Co. and other subsidiaries owns about 50 per cent of the Lake Superior iron ore reserves and

"Monopoly Study" Swings to Steel

■ Caught during the ceremonies preceding opening of the temporary national economic committee's hearings on the steel industry: Senator Joseph C. O'Mahoney left, committee chairman; E. R. Stettinius Jr., center, United States Steel Corp. chairman; B. F. Fairless, right, president of U. S. Steel. NEA photo

"while exact percentages are not available, I would estimate that other integrated steel companies own by direct leases, or through ownership in mining companies, in the neighborhood of two-thirds of the balance, the remaining one-third owned by fee owners or merchant producers who are not producers of steel."

The witness told the committee it is generally believed the known ore reserves in the Lake Superior district are in the neighborhood of 1,400,000,000 tons of which by far the greatest percentage is in Minnesota. To supplement this tonnage, he said, there are large quantities of low-grade ore, not commercial as mined, which will be made available eventually through improvements in processing.

E. B. Greene, Cleveland-Cliffs Iron Co., Cleveland, and Crispin Oglebay, Oglebay, Norton & Co., Cleveland, were called at the same time to discuss the acquisition of two-thirds of the stock of Oglebay, Norton by Cleveland-Cliffs. The two witnesses were questioned by Abe H. Feller, of the department of justice, TNEC Chairman O'Mahoney and Senator King. Mr. Greene said his company was founded in 1890 and now has assets of some $69,000,000. The company's fleet of vessels on the Great Lakes is fourth in capacity.

Explain Stock Transaction

Regarding the stock acquisition of Oglebay, Norton & Co. by Cleveland-Cliffs, Mr. Greene said that at the time of the purchase of the stock in 1930 there were many steel mergers and that another large one was contemplated. His company believed that control of Oglebay, Norton would help it to sell more ore to the larger steel units, and would strengthen the ore people.

Mr. Oglebay said he had believed the consolidation would greatly benefit his own company and would allow them to be on the "inside" in case of the expected steel merger.

It was testified that Cleveland-Cliffs paid 10,000 shares of its preferred stock for two-thirds of Oglebay, Norton. At that time, Mr. Greene told the committee, the shares were selling above par.

During this discussion Mr. Feller introduced a letter written by W. G. Mather, president of Cleveland-Cliffs, to S. R. Elliott, Ishpeming, Mich., dated May, 1930, in which Mr. Mather stated that he thought this acquisition would have a "stabilizing effect."

"The Oglebay, Norton people will continue to run their business as heretofore," the letter stated. "The advantages that will accrue to us are that we are placed in a position of greatly minimizing, if not entirely preventing, tendencies which have prevented iron ore producers from getting a reasonable price for their product."

Committee members asked Mr. Greene to explain the Mather letter. He replied he could not because he was not the writer. He contended, however, that the question of controlling prices of iron ore did not enter into the situation.

Joseph J. O'Connell, TNEC member representing the treasury department, questioned Mr. Greene as to whether or not the acquisition by Cleveland-Cliffs of Oglebay, Norton was not in violation of the Clayton act. Mr. Greene replied he was sure the matter had been taken up by competent attorneys and they were of the opinion that it was not.

Discuss 1930 "Merger"

During this testimony it was brought out that the proposed steel merger referred to would have included Wheeling Steel Corp., Republic Steel Corp., Inland Steel Co., Otis Steel Co., and Youngstown Sheet & Tube Co. It was also said that the organization of Republic was one of the parts of the merger. The depression was really the stumbling block.

Mr. Greene was recalled to the stand and told the committee, in answer to a question from Senator O'Mahoney, that in his opinion the present competitive business system should be maintained and that congress should not weaken it by passing any legislation that would tend to destroy competition. Government controlled economy, he thought, is very undesirable. Mr. Greene said in answer to persistent questions that the antitrust laws should be maintained. He insisted there is keen competition in the steel industry.

The witness was asked to go over the acquisition by his company of Oglebay, Norton and to outline the stock ownership by his company in steel companies. He said that this stock ownership did not mean that he made any effort to influence the steel companies to buy his company's ore. He said his company at all times had to meet the keenest kind of competition.

Taking up the question of integrated steel companies, Mr. Greene expressed the opinion that ten integrated companies would be better in the public interest than 100 non-integrated. Tendency toward integration, he said, is a good one, because it makes for more efficiency and lower production costs. Integration, he said, is one of the reasons why American business has prospered.

Mr. Greene was questioned at length as to whether or not there is less argument now for the steel merger in the midwest than there was in 1930 when it was talked about. He said that there is. He gave as one reason the fact that all of the companies then concerned have made large expenditures for equipment and have additional facilities.

He told the committee that his firm has long-term ore contracts with Republic, Otis and Wheeling, but not with Inland and Youngstown Sheet & Tube.

George M. Humphrey, M. A. Hanna Co., Cleveland, was another witness. He gave the committee a short history of his company, said it owns 600,000 shares of National Steel Corp. stock which is worth some $45,000,000. Assets of the Hanna company now, he stated, are about $60,000,000.

His company, he said, is the raw material supplier for National Steel and operates mines and vessels.

He was questioned at some length regarding the Rowe mine in Minnesota of which six-sixteenths is owned by his company. Apparently committee experts were trying to show that the mine was not opened so that the market would not be flooded with ore. Mr. Humphrey explained that there is only very low-grade ore in the mine and that it is not merchantable. He said that in his opinion the mine should not be used for 30 years.

Place Letters in Record

Emmett and Patrick Butler, of Butler Bros., St. Paul, were other ore witnesses. While they were on stand Feller introduced a letter from Patrick Butler to his father, Emmett, dated April, 1934, stating: "I saw Hoyt yesterday at which time he told me the ore magnates had decided to retain last year's market price".

Later Feller introduced other Butler letters dealing with price fixing and similar matters. The committee was not satisfied with Patrick Butler's explanations of the letters. One of the letters placed in the record said:

"I had a talk with Elton Hoyt yesterday afternoon and he talked me out of quoting Ford on any of our grades at less than the full market price. He said the market for standard ores is still a little shaky and that it would be dangerous to quote Ford anything under the full price. On the Hume quotation there would be too much danger of the Corporation learning that we were using any basis for figuring other than that we submitted to them. And I'm afraid that our goose would be cooked if Shiras ever heard of it."

Other Butler letters from son to father were similar and Mr. Feller indicated they showed conferences between ore men as to price.

Mr. Humphrey testified allow-

(*Please turn to Page* 34)

Railroad Buying Spurred by Largest Freight Traffic in Nine Years

■ SINCE Sept. 1 the railroads have ordered more than 42,000 freight cars. This exceeds the total placed during the preceding 24 months. Awards for all of 1939 will compare favorably with the best yearly figures since 1929.

Principal rail orders announced the past two months involve 640,000 tons, or slightly more than total production the first half of 1939. Practically no rails were bought in the corresponding period last year.

Only a few months ago it was generally agreed that while a pickup in railroad equipment buying was indicated for this fall, the upturn probably would be moderate. Certainly nothing approaching the rush of buying that has marked the past 60 days was foreseen. What is responsible for this boom demand?

Several factors have contributed to the abrupt loosening of the carriers' purse strings. Foremost is the rise in freight traffic to the best level in nine years, accompanied by the largest earnings experienced since 1936.

Retrenchment in railroad buying of equipment and material in 1938 and part of 1939 was dictated by the reduced revenues that marked lowered industrial activity. The need for rehabilitation and replacement of certain facilities existed, but the means to satisfy it was lacking.

Came Sept. 1 and with it war in Europe and an acceleration in the recovery that had been under way the preceding three months among a number of industries. Freight car loadings, which averaged 682,182 cars weekly in August, jumped 100,000 cars in September and continued to climb last month to exceed 860,000 cars for a single week. This was a new high since the fall of 1930 and compares with a forecast made several months ago by railroad men that the October-November peak in traffic would be between 775,000 and 800,000 cars.

Taking carloadings as a yardstick, industrial recovery the past 60 days has bettered expectations by this margin of 60,000 to 85,000 cars. A year ago carloadings reached a top of 700,000 to 725,000 cars. In the fall of 1937 industry was slowing down rapidly and held the fourth quarter traffic peak to 825,000 to 850,000 cars.

Railroad earnings have risen with the upturn in traffic. Net railway operating income for Class 1 roads in September was $86,435,178, largest for any month since October, 1936, with $39,809,372, and the best September since 1930. Gains of 71.6 and 45 per cent were shown over the corresponding months of 1938 and 1937, respectively.

Figures are not available for October, but earnings improved further and probably were the highest for that month since 1930 or 1929. Indicative of the close control railroads are exerting over costs, gross revenues in September rose more rapidly than expenses, thereby swelling net operating income.

The performance of traffic and earnings in recent weeks appears to have justified the decision made by the railroads in September to prepare for a pickup in business. Member roads of the Association of American Railroads met in Washington, Sept. 19, at which time it was unanimously agreed that immediate steps be taken to place motive power and cars in shape to handle any possible increase in traffic. Effectiveness of these steps has been demonstrated by the absence of any serious car shortages during the recent bulge in traffic.

Entered Market Early

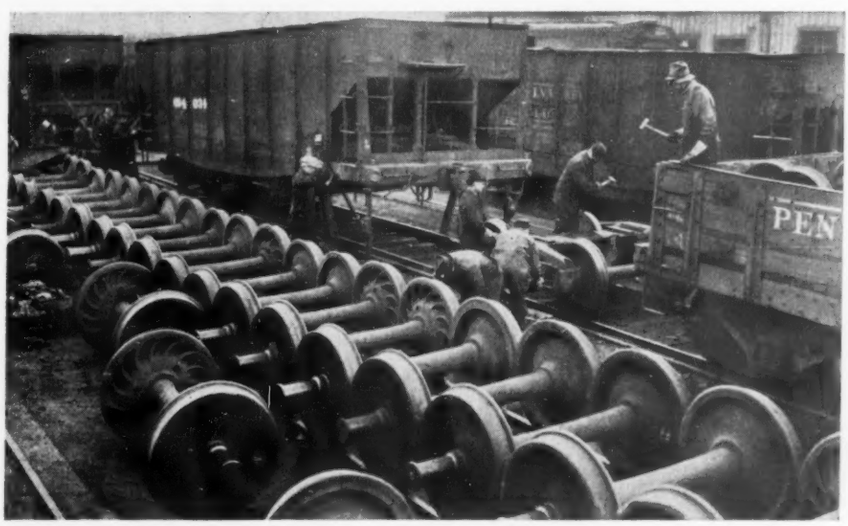
Rail buying the past nine weeks has been less spectacular than appears at first glance. This arises from the fact the roads entered the market for 1940 requirements earlier than usual. A year ago, for example, rail buying was inconsequential until November. Principal orders placed the last four months of 1938 totaled about 150,000 tons, or less than one-fourth as much as was contracted for in September and October this year. However, the first quarter of 1939 was the major period of rail buying, purchases in those three months totaling 435,000 tons. It is unlikely the first quarter of 1940 will match that figure.

Not all roads that ordered rails in late 1938 or early 1939 have been in the market lately, and vice versa. A list of 20 representative roads in both groups, however, shows total purchases for 1940 needs of 527,000 tons, an increase of 19.3 per cent over the 442,000 tons ordered for 1939.

An important reason for the rapid influx of rail contracts lately was the abrupt increase in backlogs of steel producers, which, along with prospects for heavy export demand, gave indications of retarding deliveries the ensuing several months. Furthermore, conditions brought about partly by the European war threatened to raise steel prices early next year.

The same circumstances were instrumental to a certain extent in quickening freight car building and repairs. Freight traffic will have passed its fourth quarter peak before many of the cars ordered the past two months will be available, but the definite need for additional equipment—partly to make up past deficiencies in this respect—plus in-

Old Cars To Roll on New Wheels



■ **Reconditioning bad-order freight cars to carry the increased tonnage resulting from quickening industrial activity, a scene characteristic of railroad yards and shops. Restoration of old cars to service complements large purchases of new rolling stock. Wide World photo**

creased revenue dictated the entering of large contracts for new units.

With more than 55,000 freight cars ordered so far this year, the 1939 total already has exceeded the 1937 aggregate bookings of 51,611 units and may come close to the 1936 figure of 64,523. This would compare with only 16,303 last year. However, the recent buying wave appears to be in line with actual and prospective betterment in railway income; whether or not such purchasing can be extended depends largely on future revenue.

Purchases Reflect Earnings

This may be illustrated by the accompanying chart showing the relation between the trends in railroad earnings, freight car orders and rail production from 1929 through 1938. Net railway operating income declined sharply from 1930 until 1933, but the letdown in car buying was even more abrupt. Similarly, the recovery in car orders from 1933 through 1936 was more rapid than in earnings.

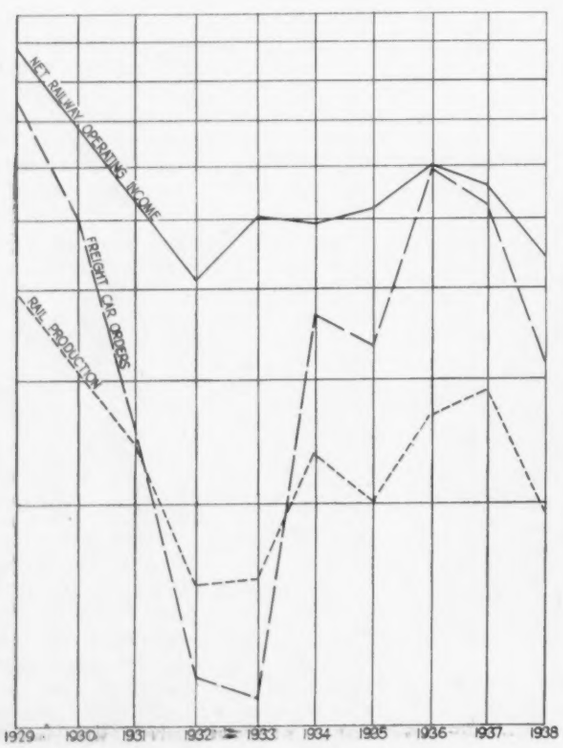
Assuming that the sharp rise in September income does not prove to have been a flash in the pan and that the decline in November and December will be no more than seasonal, 1939 net railway operating income will be close to $640,000,000, or only slightly under the $667,000,000 for 1936. With that exception it would be the highest income since 1930.

Freight cars placed this year also will be only moderately short of the 1936 figure. In other words, equipment buying and earnings will have been in about the same general relationship as in the past, with the former expanding more sharply than income compared with the year before. Since the railroads do not have the surplus of cars that existed years ago—total ownership declined 713,426 between 1923 and 1939—it is to be expected that future years will see a steadier ratio between purchases and earnings than has been true in the past.

It will be noted that rail production has borne a more constant relationship to net operating income since 1929 than have car orders. This arises from the fact that, unlike the situation in rolling stock, the roads had no large surplus of rails on hand when the depression started, consequently they continued to buy track material in relatively direct proportion to their variable rate of income.

This regulation of railroad expenses by the extent of revenue is particularly evident in the trend of expenditures for maintenance of way and equipment. For a number of years such spending has averaged close to 30 per cent of railway operating revenues.

The financial condition of the railroads as a whole still is far from robust. Despite encouraging gains in earnings, net railway operating income for 1939 probably will be only one-half that of 1929. If buying of material and equipment is to attain and hold to the volume of ten years ago it must be matched by a corresponding rate of earnings.



■ **Freight car demand is sensitive to changes in net railway operating income, orders usually varying more rapidly than earnings. Rail buying shows a fairly constant relationship to income**

LABOR

OVER 2000 RECALLED BY TOLEDO, O., CARSHOPS

■ MORE than 2000 workers have been recalled by Toledo, O., railroad shops within the past months and new men are being hired, after furlough lists are exhausted, for the first time in ten years.

New York Central shops have 500 men employed and repair work is at capacity. Wheeling & Lake Erie shops have 350 men reconditioning cars. Chesapeake & Ohio and Baltimore & Ohio shops also are working at capacity. Southern Wheel Co. plant is increasing operations and probably will reach capacity soon.

UNEMPLOYMENT DROPS 6.7 PER CENT IN SEPTEMBER

Unemployment in the United States declined 6.7 per cent in September, fell below 9,000,000 for the first time since November, 1937, according to National Industrial Conference board, New York. Number of jobless in September is estimated at 8,798,000, a decline of 631,000 from August. Manufacturing industries contributed most by adding 396,000 workers.

Total employment in September is estimated at 45,943,000.

MORE PAYDAYS PER MONTH FOR REPUBLIC WORKERS

In response to employes' request for more frequent paydays, Republic Steel Corp., Cleveland, has announced it will inaugurate a plan whereby hourly wage workers will be paid three times a month. Twice-a-month pay was in effect previously, continues for salaried employes.

Company's independent organization of employes sought greater frequency in paydays, saying workers would be able to take fuller advantage of week-end sales and could keep budgets on a cash basis.

It was found convenient to pay thrice monthly, each pay embracing a 10 or 11-day period, except in February when the last period would be 8 days. Paydays normally will be on the 6th, the 16th and 26th. Where pay falls due on Sundays or holidays modifications will be worked out. Schedule may be effective this month at some plants.

Paydays recently were shifted by Youngstown Sheet & Tube Co., Youngstown, O., now paying its employes every other Friday.

RAISES WAGES 10 PER CENT

York Ice Machinery Corp. last week announced a 10 per cent increase in hourly wage rates and a 44-hour week at plants in York, Pa., as result of agreement signed by management and employe representatives.

PRODUCTION

OPERATIONS UP 1 POINT TO NEW PEAK AT 93 PER CENT

■ STEELWORKS operations last week advanced another point to 93 per cent, practically at present capacity. Gains were made in six districts and the remaining six held their rates unchanged. Last year the rate was 57.5 per cent; two years ago 47 per cent.

Chicago—Up 1 point to 91 per cent, eighth consecutive advance from 51 per cent early in September. Five mills are at or above theoretical capacity. Carnegie-Illinois Steel Corp. has blown in another blast furnace at Gary works, making 18 stacks in production.

Central eastern seaboard—Advance of 2 points to 80 per cent, some plants being at capacity for the first time in ten years. One idle plant still considered a potential producer holds the average down several points.

Detroit—Rose 5 points to 100 per cent, all available open hearths being at capacity.

St. Louis—Unchanged at 80 per cent. An additional open hearth is scheduled to enter production early this month.

Cincinnati—Increase of 2 points to 90 per cent, practically full production.

Birmingham, Ala.—Steady at 94 per cent with 22 open hearths active. Pressure for ingots has caused Tennessee Coal, Iron & Railroad Co. to close its Ensley rail mill until early December when rolling will be resumed against a backlog of 140,000 tons for 1940 delivery, sufficient for several months' production.

New England—At 100 per cent, dropping to 90 at week end as one furnace went down for repairs.

Pittsburgh—Gain of 2 points to 93 per cent, practical capacity until rebuilding work is completed.

Wheeling—Continues at 93 per cent, with some long-idle capacity available.

Buffalo—Operations averaged 93 per cent, although at week-end the rate reached an all-time peak of 95½.

Youngstown—Sustained at 92 per cent with 70 open hearths and 21 blast furnaces in operation for the first time in history. This week steel output will be unchanged but iron output will be enlarged by new Republic blast furnace, just blown in.

Cleveland—For fourth consecutive week at 90 per cent.

■ Armour Institute of Technology and Lewis institute, Chicago, have been merged and will be known as Illinois Institute of Technology.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Nov. 4	Change	Same week 1938	Same week 1937
Pittsburgh	93	+ 2	45	41
Chicago	91	+ 1	56.5	42
Eastern Pa.	80	+ 2	35	38
Youngstown	92	None	63	51
Wheeling	93	None	59	54
Cleveland	90	None	77	54
Buffalo	93	None	51	23
Birmingham	94	None	68	54
New England	100	+10	71	30
Cincinnati	90	+ 2	75	44
St. Louis	80	None	45.5	42.4
Detroit	100	+ 5	82	90
Average	93	+ 1	57.5	47

Republic Lights Huge New Warren Furnace

■ Capable of producing more than 1200 tons of pig iron a day, Republic Steel Corp.'s huge reconstructed blast furnace was placed in operation at Warren, O., last Friday. City officials and civic leaders witnessed the lighting of the furnace, which preceded a luncheon at which Frank E. Flynn, Republic district manager, was host.

The furnace is an enlargement of a stack built in 1930, and is more than 106½ feet tall, compared with 91½ feet, the height of the old furnace. Before it was blown out in August, nearly 2,000,000 gross tons of iron were made on the 1930 lining.

Annual Foundry Output Exceeds Billion Dollars

■ Average annual foundry production in United States and Canada is valued at $1,193,677,000, according to compilations by *The Foundry*, Cleveland. The average figure is estimated on a basis of production at 50 per cent of capacity, or 8,446,000 tons of castings a year.

The magazine's survey shows foundries in United States and Canada total 5233 and that 16,781 melting units, having 25,869,000 tons melting capacity, are operated. Annual castings capacity is 16,892,000 tons and production averages 8,446,000 tons.

Gray iron foundries lead both in tonnage production and value of output. For the United States and Canada, estimated average annual production is 6,033,600 tons, valued at $543,023,850. Nonferrous foundries produce 891,775 tons, valued at $401,300,200. Malleable foundries' output is 670,200 tons, valued at $100,527,600, and steel foundries, 850,375 tons, valued at $148,825,650.

Embargo Repeal To Swell Demand

NEW YORK

■ ANOTHER spurt in steel demand is expected to follow formal repeal of the arms embargo. It is not likely to be greatly reflected in steel exports, but rather in purchases by domestic manufacturers of trucks, airplanes, machine tools and various other types of equipment and munitions, against orders from abroad.

Moreover, it also is expected to be noted in lesser degree in demand from other steel consumers, whose production is not likely to be increased directly by foreign demand, for these manufacturers, it is believed, will endeavor to cover more extensively as a protection on deliveries. Some evidences of this have already been witnessed here within the past 24 hours.

Except for approximately 100,000 tons of semifinished steel for England, and a round tonnage of pig iron soon after the outbreak of the war, little iron and steel has been purchased by the belligerents, and no great amount is expected to be bought for a number of months. The allied countries and Germany have been building up heavy stocks of munitions for more than a year. Hence, until well after there has been a succession of major military operations, steel exporters here see little possibility of any heavy steel buying by belligerents.

France has established a commission here in Rockefeller Center, and Great Britain has a commission in Canada, which may be moved, at least in part, to this country. But the principal interest of these groups for some time is expected in lines other than finished steel.

Meanwhile, neutral countries are likely to become more active in efforts to obtain shipments.

U. S. Steel Changes Name Of Export Subsidiary

■ Name of United States Steel Products Co., United States Steel Corp. export subsidiary, has been changed to United States Steel Export Co. By substituting the word "export" for the word "products" the company believes its name will more clearly indicate the nature of its business.

■ Recent business gains have revealed a skilled labor shortage for heavy industries in New York, according to the state labor department. Most needed: Skilled toolmakers, machinists and machine operators.

Finished Steel Output Up 17.9%

■ FINISHED steel made for sale in third quarter totaled 8,298,565 gross tons, an increase of 17.89 per cent over 7,039,088 tons in second quarter, 61.4 per cent of finishing capacity against 52.9 per cent, according to the American Iron and Steel institute. Steel made for export in third quarter totaled 493,557 tons, against 415,704 tons in second quarter, an increase of 18.74 per cent; production for domestic use showed 17.85 per cent increase. Compared with last year third quarter output was 56.9 per cent greater than 5,287,995 tons in that period.

Total production for nine months this year was 22,572,553 tons, compared with 14,037,151 tons for the same period in 1938. Steel made for export in nine months this year was 1,271,325 tons and in same period last year 1,057,549 tons. Average finishing capacity engaged for three quarters this year was 56.1 per cent, in same period, 1938, it was 35.6 per cent.

Tonnage supplied for conversion into further finished products in third quarter was 845,591 tons, compared with 623,368 tons in second quarter and 509,108 tons in third quarter, 1938. For nine months this year such tonnage aggregated 2,160,950 tons, against 1,191,977 tons in three quarters of 1938.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

Third Quarter - 1939 (period)

		Number of companies	Items	Annual Capacity Gross tons	Production for Sale—Gross Tons: Current Quarter: Total	Current Quarter: Per cent of capacity	Current Quarter: Shipments: Export	Current Quarter: Shipments: To members of the industry for conversion into further finished products	To Date (9 Months - 1939): Total	To Date: Per Cent of capacity	To Date: Shipments: Export	To Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	xxxxxxx	716,003	xxx	49,010	470,626	1,815,841	xxx	81,972	1,205,456
	Heavy structural shapes	8	2	4,796,800	561,057	46.8	29,082	-	1,494,270	41.5	67,544	xxxxxxx
	Steel piling	4	3	309,300	48,520	62.7	4,146	-	110,273	47.5	7,438	xxxxxxx
	Plates—Sheared and Universal	19	4	5,828,310	565,074	38.8	50,397	4,136	1,572,531	36.0	160,354	11,181
	Skelp	7	5	xxxxxxx	158,173	xxx	24,541	98,140	347,807	xxx	26,952	238,594
	Rails—Standard (over 60 lbs.)	4	6	3,395,300	164,556	19.4	1,202	-	796,224	31.3	7,695	xxxxxxx
	Light (60 lbs. and under)	6	7	418,500	17,508	16.7	1,028	-	51,398	16.4	14,276	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	105,000	5,670	21.6	1,070	-	19,783	25.1	2,437	xxxxxxx
	Splice bar and tie plates	14	9	1,290,550	63,875	19.8	1,056	-	300,955	31.1	3,739	xxxxxxx
	Bars—Merchant	35	10	xxxxxxx	763,286	xxx	35,069	76,040	2,029,214	xxx	75,126	204,784
	Concrete reinforcing—New billet	14	11	xxxxxxx	240,102	xxx	14,164	-	650,520	xxx	41,536	xxxxxxx
	Rerolling	19	12	xxxxxxx	40,835	xxx	1,545	-	115,298	xxx	6,081	xxxxxxx
	Cold finished—Carbon	18	13	xxxxxxx	124,003	xxx	2,055	-	339,661	xxx	4,393	xxxxxxx
	Alloy—Hot rolled	14	14	xxxxxxx	165,486	xxx	1,598	15,645	434,441	xxx	12,146	38,248
	Cold finished	14	15	xxxxxxx	13,914	xxx	42	-	39,210	xxx	169	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	17,364	xxx	381	-	44,913	xxx	725	xxxxxxx
	TOTAL BARS	53	17	11,570,970	1,364,990	47.2	54,854	91,685	3,653,257	42.1	140,176	243,032
	Tool steel bars (rolled and forged)	15	18	94,160	10,317	43.8	1,429	-	26,625	37.7	2,555	xxxxxxx
	Pipe and tube—B. W.	15	19	1,623,800	217,635	53.6	7,381	-	563,259	46.2	20,634	xxxxxxx
	L. W.	11	20	1,316,580	82,429	25.0	2,741	-	215,392	21.8	7,327	xxxxxxx
	Electric weld	4	21	615,000	78,538	51.1	1,596	-	160,357	34.8	5,151	xxxxxxx
	Seamless	15	22	2,968,900	398,662	53.7	23,815	-	981,461	44.1	57,038	xxxxxxx
	Conduit	6	23	153,670	15,244	39.7	461	-	42,778	37.1	1,307	xxxxxxx
	Mechanical Tubing	5	24	182,100	21,349	46.9	188	-	65,432	47.9	2,091	xxxxxxx
	Wire rods	19	25	xxxxxxx	174,492	xxx	5,079	55,536	452,846	xxx	18,719	147,721
	Wire—Drawn	38	26	1,970,195	297,731	60.4	12,909	2,114	813,289	55.0	41,026	8,925
	Nails and staples	19	27	1,080,760	160,588	59.4	6,490	-	429,342	53.0	18,497	xxxxxxx
	Barbed and twisted	16	28	428,075	45,791	42.8	13,134	-	145,929	45.5	33,682	xxxxxxx
	Woven wire fence	15	29	695,330	48,042	27.6	438	-	182,795	35.1	1,332	xxxxxxx
	Bale ties	11	30	110,680	17,347	62.7	11	-	41,566	50.1	67	xxxxxxx
	All other wire products	5	31	24,380	1,138	18.7	4	-	3,360	18.4	16	xxxxxxx
	Fence posts	12	32	134,700	9,890	29.4	439	-	37,942	37.6	1,033	xxxxxxx
	Black plate	12	33	462,815	89,771	77.6	2,230	27,842	246,679	71.1	5,063	83,299
	Tin plate—Hot rolled	10	34	1,527,360	129,054	33.8	17,590	-	373,793	32.6	57,131	xxxxxxx
	Cold reduced	10	35	1,936,200	458,173	94.7	55,961	-	1,191,241	82.0	121,997	xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	1,043,410	xxx	55,885	49,287	2,759,658	xxx	163,449	113,532
	Galvanized	16	37	xxxxxxx	335,325	xxx	27,314	-	865,645	xxx	74,127	xxxxxxx
	Cold rolled	18	38	xxxxxxx	389,422	xxx	18,809	-	1,174,467	xxx	73,904	xxxxxxx
	All other	16	39	xxxxxxx	98,268	xxx	5,760	-	286,963	xxx	12,416	xxxxxxx
	TOTAL SHEETS	27	40	11,374,065	1,866,425	65.6	107,768	49,287	5,086,733	59.6	323,896	113,532
	Strip—Hot rolled	24	41	3,209,300	292,478	36.5	9,748	46,225	759,618	31.6	23,624	109,210
	Cold rolled	36	42	1,160,910	152,222	52.4	3,136	-	398,591	45.8	7,327	xxxxxxx
	Wheels (car, rolled steel)	5	43	380,320	27,555	29.0	3,630	-	77,676	27.2	4,309	xxxxxxx
	Axles	5	44	425,900	12,918	12.1	510	-	32,362	10.1	3,434	xxxxxxx
	Track spikes	11	45	300,100	22,865	30.5	468	-	73,835	32.8	1,385	xxxxxxx
	All other	4	46	9,450	2,485	105.2	15	-	7,313	103.2	101	xxxxxxx
	TOTAL STEEL PRODUCTS	135	47	xxxxxxx	8,298,565	xxx	493,557	845,591	22,572,553	xxx	1,271,325	2,160,950
	Estimated total steel finishing capacity based on a yield from ingots of 70.0 %	-	48	48,514,000	xxxxxxx	61.4	xxxxx	xxxxxxx	xxxxxxx	56.1	xxxxxxx	xxxxxxx
	Pig iron, ferro manganese and spiegel	28	49	xxxxxxx	1,043,229	xxx	53,775	273,106	2,667,218	xxx	75,674	671,185
	Ingot moulds	4	50	xxxxxxx	90,258	xxx	479	-	208,663	xxx	808	xxxxxxx
Iron Products	Bars	9	51	147,200	7,711	21.0	31	575	20,898	18.9	87	1,240
	Pipe and tubes	3	52	97,730	9,999	40.9	223	-	29,644	40.4	527	xxxxxxx
	All other	2	53	63,560	4,153	26.1	1,005	1,325	9,862	20.7	1,636	3,567
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	11	54	250,530	21,863	34.9	1,259	1,900	60,404	32.1	2,250	4,807

Total number of companies included -- 156

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products Current quarter 7,452,974 *G.T.;* 61.4 *% of Finishing Capacity.*
To date 20,411,603 *G.T.;* 56.1 *% of Finishing Capacity.*
The above tonnages represent 70.0 *% of the ingots produced by companies whose products are included above.*

Pig Iron Output Reaches 10-Year Peak; 50 Stacks Added in 2 Months

■ PIG IRON production in the United States in October reached an all-time high for that month and was largest since August, 1929. Nineteen more stacks became active, making a total of 50 blown in since Sept. 1.

October output, 3,626,684 gross tons, was 752,630 tons, or 26.2 per cent, above September's total of 2,874,054 tons. In August, 1929, 3,746,198 tons was produced. The peak for 1937 was 3,616,954 tons made in August that year.

Average daily production was 116,990 tons, the highest October rate on record. It is 21,188 tons, or 22.1 per cent, more than 95,802 tons averaged in September, and is highest for any month since August, 1929, when the daily rate was 120,845 tons. The October, 1938, average was 66,694 tons.

MONTHLY IRON PRODUCTION
Gross Tons

	1939	1938	1937
Jan.	2,175,123	1,444,862	3,219,741
Feb.	2,060,183	1,306,333	3,020,006
March	2,393,255	1,470,211	3,470,470
April	2,055,326	1,388,008	3,400,636
May	1,717,522	1,260,937	3,545,180
June	2,119,422	1,060,747	3,115,302
July	2,356,036	1,213,076	3,501,359
Aug.	2,660,513	1,495,514	3,616,954
Sept.	2,874,054	1,683,097	3,417,960
Oct.	3,626,684	2,067,499	2,891,026
Ttl. 10 mo.	24,038,418	14,390,284	33,198,634
Nov.	.....	2,286,661	2,007,031
Dec.	.....	2,212,718	1,503,474
Total	.....	18,889,663	36,709,139

Output for first ten months of 1939 amounted to 24,038,418 tons, 9,648,124 tons, or 67 per cent, over the 14,390,284 tons made in the period in 1938. In first ten months of 1937, 33,198,634 tons was made.

Relating production to capacity, operations in October averaged 85.2 per cent, highest since August, 1929, with 87.3 per cent. September rate was 69.7; August, 62.4; October, a year ago, 48.

During October, five merchant stacks were made active and 15 steelworks units placed in blast with one in this class made inactive. The net of 19 furnaces added brings total in blast at end of October to 188, the highest since August, 1937, when 191 were active. At close of October, 1938, 114 units were in operation. September figure was 169; August, 138; July, 130.

AVERAGE DAILY PRODUCTION
Gross Tons

	1939	1938	1937	1936
Jan.	70,175	46,608	103,863	65,461
Feb.	73,578	46,655	107,857	63,411
March	77,201	47,426	111,951	66,004
April	68,511	46,267	113,354	80,316
May	55,404	40,675	114,360	85,795
June	70,647	35,358	103,843	86,551
July	76,001	39,131	112,947	83,735
Aug.	85,823	48,242	116,676	87,475
Sept.	95,802	56,103	113,932	90,942
Oct.	116,900	66,694	93,259	96,509
Nov.	.....	76,222	66,901	98,331
Dec.	.....	71,378	48,499	100,813
Ave.	79,073	51,752	100,573	83,832

Furnaces blown in during October were: In Colorado: Minnequa "E", Colorado Fuel & Iron Co. In Illinois: Federal "A", Interlake Iron Corp.; South Chicago No. 3, Youngstown Sheet & Tube Co. In Indiana: Gary No. 1, Carnegie-Illinois Steel Corp. In Minnesota: One Zenith, Interlake Iron Corp. In New York: Harriet "Y", Wickwire Spencer Steel Co., Inc. In Ohio: One Martins Ferry, Wheeling Steel Corp. In Pennsylvania: Monongahela No. 4, National Tube Co.; Monessen No. 2, Pittsburgh Steel Co.; Duquesne No. 6, Edgar Thomson "C", Farrell No. 3, and Isabella No. 3, Carnegie-Illinois Steel Corp.; Aliquippa No. 5, Jones & Laughlin Steel Corp.; One Sharpsville, Pittsburgh Coke & Iron Co.; Midland No. 2, Pittsburgh Crucible Steel Co.; Cambria "H" and Steelton "B", Bethlehem Steel Co.; Palmerton No. 1, New Jersey Zinc Co.; Swede No. 2, Alan Wood Steel Co.

Stacks blown out or banked were: In Pennsylvania: Steelton "A", Bethlehem Steel Co.

OCTOBER IRON PRODUCTION

	No. in blast last day of Oct.	Sept.	Total tonnage Merchant	Nonmerchant
Alabama	18	8	113,777*	145,033
Illinois	14	12	67,610	251,884
New York	11	10	58,177	179,363
Ohio	42	41	90,730	736,787
Penna.	64	52	93,088*	1,026,318*
Colorado	3	2		
Indiana	15	14	2,959*	599,332
Maryland	6	6		
Virginia	1	1		
Kentucky	2	2		
Mass.	1	1		
Michigan	5	5		
Minnesota	2	1	21,694	239,932
Missouri	0	0		
Tenn.	0	0		
Utah	1	1		
West Va.	3	3		
Total	188	169	448,035*	3,178,649*

*Includes ferromanganese and spiegeleisen.

Farm Machinery Exports Off 11% in September

■ Farm implement and machinery exports in September, totaling $5,748,710, were 11 per cent below a total of $6,434,837 in the corresponding month last year, according to the machinery division, department of commerce.

Tillage implements at $421,841 were 18 per cent under September, 1938. Cultivators and planters were shipped in larger volume, but plows, harrows and other types declined sufficiently to bring down the total. Harvesting machinery showed a loss of 23 per cent, but seed separators made a slight gain, totaling $173,703 against $172,977 in September, 1938.

Exports of tractors and parts in September were valued at $4,257,936, slightly lower than $1,573,853 in the same month last year. The decline was due to smaller total of wheel and carburetor type tractors, while fuel-injection type tracklaying units showed an increase.

RATE OF FURNACE OPERATION
(Relation of Production to Capacity)

	1939[1]	1938[2]	1937[3]	1936[4]
Jan.	51.0	33.6	76.6	48.2
Feb.	53.5	33.6	79.5	46.4
March	56.1	34.2	82.5	48.5
April	49.8	33.4	83.7	59.1
May	40.2	29.4	84.3	63.1
June	51.4	25.5	76.6	63.6
July	55.0	28.2	82.9	61.5
Aug.	62.4	34.8	85.7	64.3
Sept.	69.7	40.5	83.7	66.9
Oct.	85.2	48.0	68.4	71.0
Nov.	....	55.0	49.3	72.3
Dec.	....	51.4	35.6	74.2

[1]Based on capacity of 50,198,920 gross tons, Dec. 31, 1938; [2]capacity of 50,606,400 gross tons, Dec. 31, 1937; [3]first half on capacity of 49,512,737 tons, Dec. 31, 1936—second half on capacity of 49,727,737 tons, June 30, 1937; [4]capacity of 49,777,893 tons, Dec. 31, 1935. Capacities by American Iron and Steel Institute.

■ Production of malleable iron castings in September totaled 41,427 net tons, compared with 40,212 tons in August and 29,460 tons in September, 1938, as shown by reports to the bureau of the census. Nine months' production this year was 313,509 tons, last year 185,791 tons.

Leading Steelmakers' Quarterly Earnings Increase 142.5 Per Cent

■ AGGREGATE third quarter net earnings for 18 leading steel producers, representing 63,601,560 tons of ingot capacity, or 89.3 per cent of the industry's total, were $29,289,843, an increase of 142.5 per cent over the $12,074,750 net profit earned in second quarter by the same companies. A deficit amounting to $8,317,792 was reported by the 18 companies for third quarter, 1938.

Nine months' earnings for 17 companies totaled $51,416,398, compared to $21,769,600 deficit incurred by the companies for the same 1938 period. Allegheny Ludlum Steel Corp., merged Aug. 16, 1938, is not included in this nine-months comparison.

United States Steel Corp. declared the regular preferred dividend of $1.75, payable to stockholders Nov. 20. E. R. Stettinius Jr., chairman, stated:

"Earnings for the third quarter of 1939 were $28,247,189 and net available for capital stocks amounted to $10,420,445.

"The net income earned on the tangible investment, before deducting interest charges on bonds and obligations, is equal, for the quarter, to a rate of 3.2 per cent per annum, and for the nine months to a rate of 1.6 per cent per annum.

"Shipments of finished steel products during the third quarter (2,465,161 tons) were approximately 14.2 per cent greater than for the second quarter. Demand for all types of steel increased.

"Due to both general improvement in business and to seasonal factors, earnings for the third quarter showed improvement over the second quarter of the year. Prices realized for steel products shipped during the third quarter remained at substantially the levels that prevailed during the early part of the year.

"Shipments are keeping pace with production and, except for the seasonal accumulation of iron ore and other stocks, there has been no general increase in inventories.

"Net current assets of the corporation and subsidiaries at Sept. 30, 1939, before deducting current dividend declarations, compare as follows:

Sept. 30, 1939	$433,514,528
June 30, 1939	410,186,626
March 31, 1939	426,924,776
Dec. 31, 1938	426,984,023

"The above net amounts are calculated on the basis of including in current liabilities, capital obligations due within one year of the dates shown and excluding from current assets the receivables not collectible within one year. The increases at Sept. 30 over June 30 in net current assets amounted to $23,327,902.

"Employment and payroll statistics:

	9 Mos. ending Sept. 30 1939	1938	Per cent of Incr.
Aver. No. employes	212,540	201,533	5.46
Total payroll	$254,060,918	$202,488,466	25.47

"There are on the payroll at present approximately 235,873 employes, representing an increase over three months ago of 10.4 per cent.

"Expenditures for construction work and plant improvements during the quarter ending Sept. 30, 1939, principally on projects previously under way or of a character necessary in currently maintaining productive facilities, less credit for property sold, amounted to approximately $6,000,000. Also, approximately $1,200,000 of capital obligations maturing or retirable by sinking funds have been paid, making a total net outlay on capital account in the third quarter of 1939, of $7,200,000. As of Sept. 30, the unexpended balances on approved appropriations for property additions and betterments amount to $32,000,000."

	Third Quarter ending Sept. 1939	Nine months ending Sept. 1939	1938
Earnings	$28,247,189	$62,897,090	$28,143,537
Net income	10,420,445	12,390,756	12,150,368*
Shipments of finished steel products:			
Tons	2,465,161	6,858,427	4,588,224
Per cent of capacity	54.6	51.0	33.9

*Deficit.

INLAND AT PEAK, NOT BOOKING EXPORTS

Inland Steel Co., Chicago, reports third quarter net profit of $2,587,750, equal to $1.59 per share, compared to $1,098,245, or 69 cents a share for the same 1938 period.

Eighteen Leading Steel Producers' Financial Statements Summarized

	Third Quarter, 1939	Second Quarter, 1939	Third Quarter, 1938	Nine Months, 1939	Nine Months, 1938	Rated Ingot Capacity
U. S. Steel Corp.	10,420,445	1,309,761	5,847,791*	12,390,756	12,150,368*	25,790,000
Bethlehem Steel Corp.	$5,377,470	$3,822,927	$446,866	*11,609,456	$1,592,079	10,042,000
Republic Steel Corp.	2,815,339	550,412	2,387,556*	3,898,650	8,306,437*	6,500,000
Jones & Laughlin Steel Corp.	1,129,001	471,287*	1,958,810*	281,189	4,882,838*	3,660,000
National Steel Corp.	2,903,881	1,958,755	1,813,997	7,289,304	3,908,495	3,400,000
Youngstown Sheet & Tube Co.	765,066	329,086	727,546*	1,311,259	748,042*	3,120,000
Inland Steel Co.	2,587,750	1,760,459	1,098,245	6,372,810	3,156,418	2,760,000
American Rolling Mill Co.	600,794	875,671	556.995*	2,269,944	1,280,159*	2,669,520
Wheeling Steel Corp.	1,639,647	939,995	606,908	3,408,303	549,015*	1,750,000
Colorado Fuel & Iron Corp.§	231,282	699,594	143,752*	1,094,506	924,176*	885,040
Otis Steel Co.	184,517*	431,767*	465,596*	435,958*	1,283,076*	828,000
Allegheny Ludlum Steel Corp.**	327,772	147,740	352,180*	682,094	†	537,000
Sharon Steel Corp.	59,484*	148,157*	19,065*	200,028*	362,980*	500,000
Granite City Steel Co.	53,953	21,610	18,559	88,999	253,174*	400,000
Continental Steel Corp.	198,138	253,128	192,360	730,445	403,660	325,000
Keystone Steel & Wire Co.	273,922	380,738	83,224	972,269	574,848	250,000
Wickwire Spencer Steel Co.	52,661*	149,100*	137,643*	360,514*	587,481*	150,000
Rustless Iron & Steel Corp.	262,045	225,185	18,983	695,008	77,354*	‡35,000
Totals	$29,289,843	$12,074,750	$8,317,792*	$51,416,398	$21,769,600*	63,601,560

*Loss. †Merged Aug. 16, 1938; no earlier reports available. ‡Stainless steel. **Fiscal year ends Oct. 15. §Fiscal year ends June 30.

More Consumers Show Increase in Earnings

■ Net profit of 89 companies among equipment manufacturers, suppliers and leading iron and steel consumers during the first nine months totaled $135,490,971, an increase of 109.7 per cent over $64,609,535 reported by the identical companies for the corresponding 1938 period. Only nine of the group reported a third quarter net loss, whereas 35 incurred a deficit last year. Previous tabulations in STEEL, Oct. 23, p. 23 and Oct. 30, p. 22, listed 58 companies; the following includes 31. All figures are net earnings except where asterisk denotes loss:

	Third Quarter		Nine Months	
	1939	1938	1939	1938
Air Reduction Co. Inc., New York	$1,291,816	$962,273	$3,524,411	$2,646,620
American Steel Foundries Co., Chicago	75,191	543,533*	189,533	1,409,728*
American Stove Co., St. Louis	351,114	189,416	1,051,755	156,446
Bower Roller Bearing Co., Detroit	199,197	72,711	627,531	215,204
Consolidated Steel Corp. Ltd., Los Angeles	45,313	8,881	107,384	84,026
Crosley Corp., Cincinnati	243,681*	41,976*	158,376	43,484*
Curtiss-Wright Corp., New York	1,172,748	444,036	4,543,552	2,625,898
Detroit Gasket & Mfg. Co., Detroit	80,369	19,102	321,472	14,955
Electric Auto-Lite Co., Toledo, O.	1,019,797	191,228	3,850,734	7,571
Eureka Vacuum Cleaner Co., Detroit	75,938*	86,349*	146,596*	235,369*
Ex-Cell-O Corp., Detroit	193,685	143,443	530,514	301,693
General Electric Co., Schenectady, N. Y.	8,652,439	4,371,300	25,022,631	17,548,256
General Ry. Signal Co., Rochester, N. Y.	130,822	8,852*	94,534	119,142*
Gillette Safety Razor Co., Boston	801,453	631,298	2,418,360	2,061,723
Holland Furnace Co., Holland, Mich.	640,560	640,632	773,504	760,997
Hoskins Manufacturing Co., Detroit	112,868	57,684	315,455	173,113
Houdaille-Hershey Corp., Detroit	9,035	59,013*	773,045	113,320
International Business Mach. Corp., N. Y.	2,198,339	2,032,056	6,590,695	6,051,359
Kelsey-Hayes Wheel Co., Detroit	11,416	486,384*	391,055	963,152*
Link-Belt Co., Chicago	514,957	321,388	957,436	703,740
Maytag Co., Newton, Iowa	234,981	236,327	798,669	322,155
Midland Steel Products Co., Cleveland	248,266	37,263	1,265,643	371,960
National Acme Co., Cleveland	78,385	47,429*	188,121	70,871
Parker Rust-Proof Co., Detroit	211,155	144,215	667,096	325,777
Poor & Co., Chicago	54,000	37,000*	436,000	71,000*
Reynolds Metals Co., New York	324,275	225,579	812,979	531,348
Revere Copper & Brass Inc., New York	331,505	539,801*	336,135	2,359,510*
Savage Arms Corp., New York	155,185	109,746	229,378	32,561
Simonds Saw & Steel Co., Boston	232,225	135,798	603,571	218,566
Sullivan Machinery Co., Chicago	88,880*	121,826*	124,894*	432,436*
Yale & Towne Mfg. Co., Philadelphia	222,213	175,522*	234,804	323,050*

Second quarter profit was $1,760,459, equal to $1.08 a share. For nine months ended Sept. 30 indicated net profit was $6,372,810, equal to $3.92 a share, against $3,156,418, or $2 a share for corresponding 1938 period. Net profit for 12 months ended Sept. 30 was $8,132,595, equal to $5 per share; for the previous 12 months, $3,807,721, or $2.42 per share. Company has declared $1 dividend on capital stock, payable Dec. 1 to record of Nov. 14.

Capacity Production to Continue

Production and shipments during October will be the largest of any month in the company's history. "Present operations are at a rate in excess of theoretical capacity and commitments already on the books indicate a continuation of production as close to actual capacity as operating conditions will permit throughout the remainder of the year," the company reports.

"Although demand from foreign countries has been very heavy since the outbreak of the European war, we have not quoted on such business and no export tonnage is being booked at present. Furthermore, for the past six weeks sales to domestic customers for future deliveries have been made in relation to prior purchases and this practice is being maintained."

"EIGHT GOOD AND SIX BAD YEARS IN STEEL"

■ IN AN EDITORIAL in the Oct. 30 issue of STEEL, entitled "A Reasonable Profit for Steel," it was stated erroneously that the steel industry made an average net profit of 6.822 per cent on its capital investment during the eight "good" years, 1925-6-7-8-9, and 1930-6-7. Actually the net profit during these years averaged 6.14 per cent. It also was stated erroneously that the industry returned an average net loss of 0.33 per cent during the six "bad" years, 1931-2-3-4-5-8. Actually the net loss averaged 0.055 per cent.

These averages, it may be explained as a result of questions which have been received by the editors, were calculated arithmetically from the figures denoting profits and losses during those years in terms of percentage return on invested capital.

A correspondent has compared these averages with the weighted average return on investment during the eight good years and six poor years, as follows:

	Per cent return
Eight good years:	
Weighted average	6.11
Arithmetic average	6.14
Six poor years:	
Weighted average	0.09*
Arithmetic average	0.05*
Total period:	
Weighted average	3.45
Arithmetic average	3.49

*Loss.

"In preparing the weighted average," he explains, "we used, wherever possible, the capitalization and earnings before dividends and interest, as shown in STEEL'S annual financial summaries. We could not use such summaries for 1925, 1926 and 1929 since the returns and earnings for such years were changed in 1926, 1927 and 1930 comparative tabulations, but no figures were given for the corresponding change in capitalization; hence capitalization figures used to determine the return for such years were not available.

"To overcome this difficulty we calculated the capitalization for each of such years by dividing the rate of return per your tabulation into the earnings before deducting dividends and interest, and used such calculated capitalization in the weighted average determination. The complete results, which show a very close relationship to the arithmetic averages, are as follows:

	Total Investment	Earnings	Rate of return per cent
1925	$3,891,412,200†	$218,308,228	5.61
1926	3,864,986,100†	265,138,052	6.86
1927	3,961,847,231	207,360,040	5.22
1928	4,016,015,539	262,968,153	6.55
1929	3,756,264,100†	371,118,899	9.88
1930	4,376,909,581	198,775,599	4.54
1936	3,818,758,562	167,954,226	4.40
1937	3,984,383,189	241,938,183	6.07
8 Good years	$31,670,576,502	$1,933,561,380	6.11
1931	$4,291,815,610	$ 17,405,647	0.40
1932	4,073,597,898	116,175,256*	2.85*
1933	3,948,658,331	35,575,332*	0.90*
1934	3,906,638,799	14,108,229	0.36
1935	3,690,355,323	77,269,933	2.09
1938	3,848,059,550	22,061,470	0.57
6 Poor years	$23,759,125,511	$ 20,905,309*	0.09*
14 Years	$55,429,702,013	$1,912,656,071	3.45

*Loss. †Calculated as explained above.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ COMPLETE economic recovery is blocked by the national labor relations act, asserts the United States Chamber of Commerce's committee on manufacture.

Group has recommended amendments to a special house committee which will soon begin hearings on suggested changes in the labor law. Studying the legislation throughout the four years since it was enacted, chamber of commerce committee concludes:

As administered by the labor board, the act has materially increased rather than decreased the number and intensity of strikes and other industrial strife.

It has interfered with, rather than prompted, the amicable settlement of industrial disputes and the functioning of public agencies set up for that purpose.

It has disrupted, rather than fostered, friendly relations between management and worker, with resulting discord among employes, reduced efficiency in operation, increased costs.

It has deprived large numbers of workers of a right the law was presumed to protect—that of bargaining collectively through representatives of their own choosing.

It has fomented class distinctions and class hatreds.

By subjecting management to new risks and uncertainties, both as to rights and obligations, it has effectively prevented the expansion of existing production facilities and creation of new facilities, both essential to the nation's economic growth.

AVILDSEN TO SERVE WITH TNEC DURING STEEL HEARINGS

Designated a commerce department representative on temporary national economic committee recently was Clarence Avildsen, chairman of directors' board, United Drill & Tool Corp., Chicago, who was appointed special adviser to the secretary of commerce in September. Mr. Avildsen sat in on recent TNEC hearings as an alternate, assumed his new duties when the committee opened sessions on the steel industry.

In 1920, Mr. Avildsen organized a trading company in Chicago with $10,000 capital to buy surplus stocks of tools and tool steel. Now known as United Drill & Tool, with assets of more than $3,000,000, the firm absorbed several tool manufacturers, gives employment to 1100 skilled workers.

John V. W. Reynders, New York, consulting engineer with experience in steel and mining, will assist Mr. Avildsen during the steel hearings. Mr. Reynders knows steel's problems, having been elected production head of Pennsylvania Steel Co. in 1892, later serving as president of American Tube & Stamping Co. In 1933 he was an adviser to the government in formulation of the steel industry's NRA code.

THREATENS COURT TEST OF TRADE PACTS PROGRAM

Court proceedings to challenge constitutionality of the administration's trade agreements program are threatened by Governor Vanderbilt of Rhode Island. Correspondence in the matter between the governor and Henry F. Grady, assistant secretary of state, was made public last week.

Secretary Grady, who before he went to the state department was a member of United States tariff commission in charge of trade agreement hearings, told Governor Vanderbilt the state department is "fully convinced the trade agreements act would be sustained in the courts. If a test case is brought challenging validity of the act, its defense on behalf of the government will be in the hands of the department of justice."

Replied Governor Vanderbilt: "Since the department of state apparently firmly believes the trade agreement program is unassailable in its constitutionality, it should have no objection to the institution of such proceedings, particularly in view of the fact the governors of Minnesota and Kansas, whose constituencies are largely composed of those supposed to have been benefited by trade agreements, recently expressed their ardent desire for adjudication of the entire matter."

WAGE MINIMA SET FOR SMALL ARMS, MUNITIONS MAKERS

New minimum wages under the Walsh-Healey act for workers employed by manufacturers supplying the federal government with small arms, ammunition and parts, explosives and munitions, have been announced by Secretary of Labor Perkins.

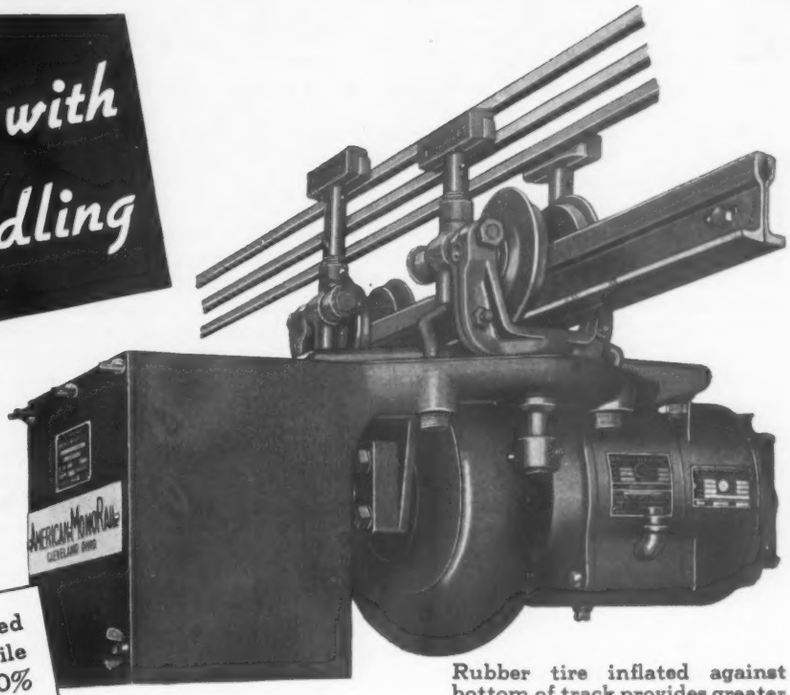
Forty-two and one-half cents an hour, or $17 per week of 40 hours, is the rate set in the manufacture of ammunition and parts for small arms and aircraft engine cartridge starters. Forty-seven and one-half cents an hour, or $19 per 40-hour week, in the fabrication of blasting and detonating caps. Fifty-seven and one-half cents an hour, or $23 per 40-hour week, in the manufacture of explosives, including dynamite, nitroglycerine, black blasting powder, pellet and fuse powder and smokeless gun powder.

LABOR GAINS SEEN IN BUSINESS UPTURN BY AFL

War's outbreak turned business hesitance to confidence as the probability of large new orders for industry became apparent, states the American Federation of Labor in its *Monthly Survey of Business.*

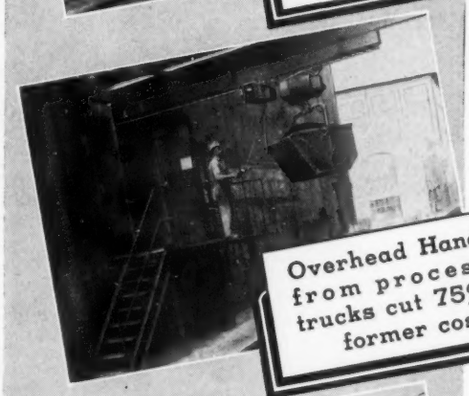
"Business men who had been buying hand-to-mouth for immediate needs," it is pointed out, "at once placed large orders, stocking up for future needs in fear of price increases. Industrial production rose to unexpected levels. Forecasters now expect the production index to

Reduce Costs with Overhead Handling



Rubber tire inflated against bottom of track provides greater tractive contact.

Body frames piled twice as high while costs dropped 50%



Overhead Handling from process to trucks cut 75% off former cost.

Elimination of congestion increased production from 26 to 48 tons per day.

Tremendous draw-bar pull from the American MonoTractor propells carriers and cranes for low handling costs.

Time studies obtained after installation of overhead handling equipment often reveal definite reductions in costs together with more productive use of man-hours.

Mechanical methods provide not only low cost movement of goods but also releases skilled labor for profitable production.

This is accomplished in American MonoRail systems by the elimination of floor congestion, by increasing unit loads, by faster and more accurate movement and finally, with the American MonoTractor, by complete automatic transportation.

Compact electrification together with the many exclusive control features of the American MonoTractor, permit the application of automatic equipment to handling problems in nearly every industry. Costs are reduced in direct proportion to the number of man-hours saved.

Engineering consultation with men of long experience in this highly specialized field often brings up hidden possibilities for cost saving or production increases. This service is available at no obligation.

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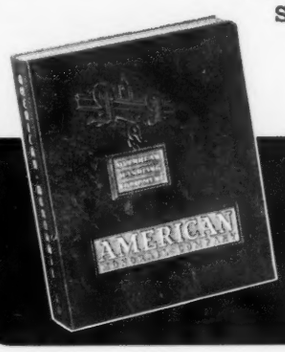

THE AMERICAN MONORAIL COMPANY

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reach 125 by December, equaling the alltime peak of June, 1929, and exceeding the 1937 high by 6 per cent.

"To supply the demand for steel, shipments of ore increased 21 per cent in September; 31 blast furnaces were brought into operation. Railroad carloadings rose above the 1937 peak as roads transported coal, ore, fluxing stone, manganese, finished steel and other products.

"The new rush of business for mills came after automobile manufacturers had already booked an increased volume of steel for fall production. It raised the nation's weekly steel production to an alltime peak.

"Rising production means decreasing unit labor costs, enabling industry to pay higher wages. It is essential that labor receive its full share of the increasing national income if recovery is to be maintained. Wage increases must, however, be based on decreased labor costs per unit of production, for labor wants permanent gains."

Monopoly Investigation Centers on Prices

(*Concluded from page* 24)

ances are made in ore sales for quantities, long-term contracts and for other reasons.

Feller inserted into the record a letter to Mr. Arnold from Irvin Olds of United States Steel Corp., explaining the price basis of the Oliver Mining Co. Mr. Olds quoted Leroy Salsich, president of the mining company: "The Oliver company bills to the constituent steel manufacturing subsidiaries, ore delivered for their account at the established Lake Erie base price, less certain structural and shrinkage allowances. In determining the actual price of any particular grade of ore, an adjustment up or down has to be made on account of variables for iron and phosphorous and a penalty is applied to high-silica ores."

All ore men returned to the stand to be questioned regarding prices. They told the committee prices are not fixed by mutual agreement. Letters were read into the record by Feller trying to show that there was at least friendly co-operation among ore men. Leon Henderson, representing the Securities and Exchange commission on the committee, said that there is "something very peculiar about all of this."

Feller introduced a chart showing Lake Erie base price was $4.25 a gross ton from 1925 to 1929, $4.50 from 1929 to 1936 and from that date to the present it has been $4.95. This price was given as base per ton of Lake Superior ore at Lake Erie ports.

Witnesses offered various explanations for basic Lake Erie ore price from 1929 to 1937. Mr. Humphrey said it varied up and down from the base price, mainly down, and that each of the ore merchants negotiated with his customers on an individual basis, getting what he could for his ore in view of existing contracts and the business situation.

Witnesses insisted variation due to concessions as between each set of buyers and sellers made the actual prices in dollars for ore anything but identical, and that there was indeed vigorous competition.

Witnesses explained the Lake Erie base price is determined on basis of first substantial sale of the season, but declared actual sale prices vary with quality of ore, the amount contracted for and other factors. Feller called attention to the fact that the base price remained the same from 1929 to 1937.

With reference to this Mr. Humphrey said that was "because of the fact that during this period our customers were obligated to us under contracts in amounts which they could not perform. They were coming to us and asking concessions from us. We on the other hand with our reduced tonnages had costs that were very high. We were asking concessions from them and price was a matter of mutual agreement between the buyer and seller both of whom were under obligations to the other because they had over-bought and were over-committed over a period of time because of the very low tonnage of 1931 and 1932".

Arnold Outlines Case

In his opening statement, Mr. Arnold said that "it was with considerable gratification that the department (of justice) noted some weeks ago the decision of the major units of the industry to confirm existing published prices to the end of the current year.

"I do not pass judgment at this time on the problems which will beset the industry in the coming difficult months, but I confidently trust that the patriotic spirit which prompted that decision will continue to rule the industry's decisions in the future."

Mr. Arnold said the importance of a study of the steel industry cannot be emphasized too strongly.

"Our industrial civilization is fundamentally based on steel. Automobiles, agricultural implements, machinery, containers, railroads, shipbuilding, construction and innumerable other industries depend on the steel industry for their most essential raw material.

"The steel industry itself constitutes a major segment of our economy. It ranks first among manufacturing industries in the number of its employes and third in the value of product. The total capital investment by the companies who are its members is in excess of $4,000,000,000; the annual value of its products is nearly $3,000,000,000; and it employs in the neighborhood of 600,000 people."

Arnold called the committee's attention to the fact that the President, in his message to the congress requesting the investigation, said; "One of the primary causes of our present difficulties lies in the disappearance of price competition in many industrial fields, particularly in basic manufacture where concentrated economic power is most evident and where rigid prices and fluctuating payrolls are general."

It is widely believed, said Mr. Arnold, that these phenomena are characteristic of the iron and steel industry. "The existence in this industry of a small number of very large producers is a matter of common information. The charge is frequently made that this concentration is accompanied by other manifestations of monopoly power and that the prices of many steel products are artificially maintained."

Department Made Study

The assistant attorney general told the committee that for a number of months the department of justice has conducted a painstaking study of the practical implications of this concentration and of the extent to which this charge may be warranted.

"The hearings which begin today will be concerned mainly with price, the primary regulating mechanism in a free, competitive society. But while the emphasis will be upon price—what it is, how it is made, what factors are responsible for its behavior—other subjects within the sphere of this committee's inquiry will be touched upon. It should be emphasized that these hearings deal only with a part of the department's study. From time to time within the next few months reports on other aspects of the industry will be made to the committee.

"Our aim at this time is to show how the industry actually operates in the present and how it has operated in the very recent past. In so far as possible matters primarily of a theoretical nature have been eliminated.

"It must be emphasized that in these hearings the department takes no attitude for or against the industry or for or against any particular company. Nor will it here present any judgment upon the industry or make any recommendations with respect to public policy. Such judgments and recommendations will be presented in due time after the material has been placed before the committee."

AVIATION

AIR EXPORTS OFF 34 PER CENT UNDER U. S. ARMS EMBARGO

■ HOW severely aeronautical exports were curtailed during the first month of the war by this country's arms embargo was revealed last week by the commerce department. September shipments totaled $8,051,901, down 34 per cent from August's $12,136,845. Significantly, however, exports in September remained 74 per cent ahead of the same month last year.

Licenses for export to belligerents of arms aggregating nearly $80,000,000 were revoked by the state department when hostilities began. Warplanes, engines and parts comprised virtually all such orders. Of the total, shipments valued at $58,418,113 were destined for France, $14,788,086 for England. Builders generally have continued production under these contracts, are ready to dispatch large consignments upon lifting of the ban.

Expansion of the aircraft industry's manufacturing facilities is proceeding at a phenomenally rapid pace. When current extension projects have been completed, it is estimated, potential productive capacity will exceed $500,000,000 annually. This will represent a 57 per cent gain over approximate capacity of $319,000,000 at start of 1939.

Now under study by Consolidated Aircraft Corp. is a large-scale expansion program. To provide for new production units, firm recently leased 17 acres adjoining its San Diego, Calif., plant. Speeding output of four-engined bombers for the army air corps, Consolidated has installed a new Birdsboro hydraulic press with 9,000,000-pound capacity.

Stearman Aircraft division of Boeing Airplane Co., Wichita, Kans., has let general contract for constructing several one-story production and assembly additions costing about $200,000 with equipment.

Acquisition by its Curtiss Propeller division, Clifton, N. J., of the hollow steel propeller blade division of Pittsburgh Screw & Bolt Corp., Pittsburgh, has been announced by Curtiss-Wright Corp. Curtiss took over the Pittsburgh unit's equipment and patents Nov. 1. Developed ten years ago, hollow steel blades are proving popular for their light weight and great durability. By this purchase Curtiss is reported to have become the world's only builder of such blades. Recently the firm completed a factory expansion at Clifton, installing new machinery and doubling capacity.

To Acquire Accessory Plants

Solar Aircraft Co., San Diego, accessory manufacturer, proposes to acquire by stock exchange Aircraft Accessories Corp., Glendale, Calif. Both Aircraft Accessories and its Thomas L. Siebenthaler Manufacturing division, Kansas City, Kans., would be operated as subsidiaries, giving Solar plants in three cities.

Stock amounting to $425,000 is being marketed by Timm Aircraft Corp., Van Nuys, Calif., to finance manufacture of a high-speed plane designed by Hughes Aircraft Co. In its original model Howard Hughes flew from Los Angeles to Newark, N. J., in 7 hours and 32 minutes. The company intends to produce military planes powered with 750 and 1050-horsepower engines.

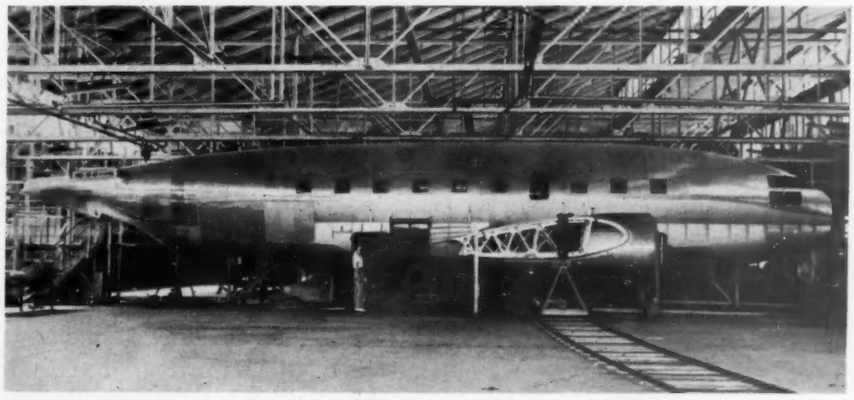
Under pressure of its rapidly mounting passenger traffic, Eastern Airlines last week signed a contract with Douglas Aircraft Co. Inc., Santa Monica, Calif., for three DC-3 transports costing nearly $350,000. Douglas discloses it has booked orders for more than 70 DC-3s and "sleeper" craft in past few months.

Recent awards for military equipment: From the war department, Sperry Gyroscope Co. Inc., Brooklyn, N. Y., indicator assemblies, $1,131,260; Bendix Products Corp., South Bend, Ind., starters, $1,013,856; General Electric Co., Schenectady, N. Y., superchargers, $878,012; from Brazil, Stearman Aircraft division of Boeing, Wichita, Kans., primary training planes, $300,000; and from Norway, Curtiss Aeroplane division of Curtiss-Wright Corp., Buffalo, 12 Curtiss-Hawk pursuit ships.

Australia's intention to place an order for 100 bombing planes with Lockheed Aircraft Corp., Burbank, Calif., was announced last week.

Aviation's growth is expanding demand for radium, declared Prof. Samuel C. Lind, University of Minnesota's chemistry dean, in a recent address before a regional meeting of the American Chemical society at Michigan State college. The larger number of luminous dials in today's aircraft is responsible, he said. "During the World war there was a maximum of eight dials on a plane's panel board, while the largest of present-day craft, with three sets of controls, have from 60 to 75."

Building 19-Ton All-Metal Sky Giant



■ Soon to be ready for test flights is this 36-passenger, all-metal, sub-stratosphere skyliner, built by St. Louis Airplane division of Curtiss-Wright Corp., Robertson, Mo. Weighing 19 tons, it has 108-foot wingspread, is said to be America's largest twin-motored transport. NEA photo

MEETINGS

A.S.M.E. ANNUAL MEETING SET FOR PHILADELPHIA

■ BROADENING usefulness of mechanical engineering profession will be the keynote of the sixtieth annual meeting of the American Society of Mechanical Engineers at Bellevue-Stratford hotel, Philadelphia, Dec. 4-8. This will be the first annual meeting outside New York since 1890. Program will include 35 technical sessions with 105 papers, and banquet Dec. 6 at which awards will be conferred.

SCRAP INSTITUTE ANNUAL CONVENTION IN PITTSBURGH

Annual convention of the Institute of Scrap Iron and Steel will be held at the William Penn hotel, Pittsburgh, Jan. 9-11. Abe Cohen, Fort Pitt Tool & Supply Co., Pittsburgh, has been named chairman of the general committee on arrangements.

ENGINEERING COUNCIL TO MEET IN JANUARY

American Engineering council will conduct its twentieth annual assembly in Washington, Jan. 11-12. At this meeting will be presented for the first time a nation-wide picture of activities of member societies, local, state and national, in solution of public welfare problems.

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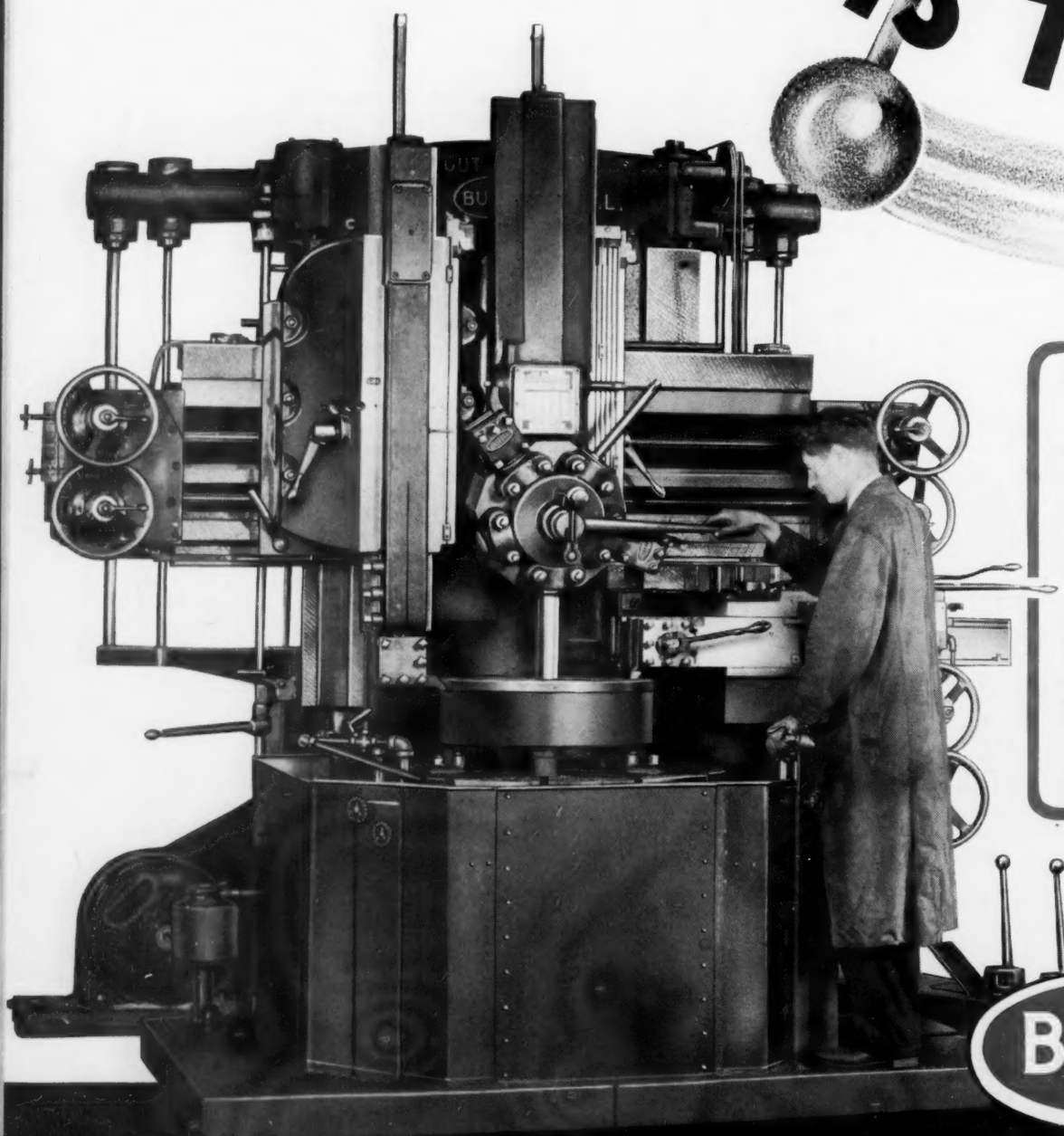

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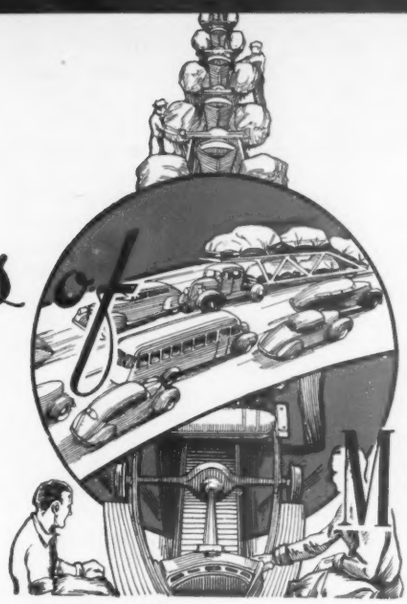

By A. H. ALLEN
Detroit Editor, STEEL

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DETROIT

■ WITH industrial activity generally breaking through the 1937 ceiling and metalworking plants throughout the country loaded to the gunwales with business, it is a strange sight to see long lines of jobless waiting their turn at the various branches of the state unemployment compensation division in this city. Explanation, of course, is the month-old tieup of operations in the Chrysler Corp. plants which are concentrated here. In addition to paralyzing the incomes of 50,000 Chrysler workmen, 15,000 Briggs workmen and the organizations of 10,000 or more Chrysler dealers through the nation, the cessation of car shipments has necessitated furloughing a number of office employes with the corporation.

Last week the Dodge truck plant here, busy on both foreign and domestic truck orders, was forced to close because of a slowdown similar to that which originated in the main plant of Dodge and forced suspension of all other Chrysler divisions, including the one at Newcastle, Ind. Picket lines promptly took up the march around the plant.

"Dues-Collecting Racket"

K. T. Keller, president of Chrysler, has added his interpretation of the situation, stating: "As I analyze it, unless the UAW-CIO gets a closed shop, a union shop, a preferential shop, or some other arrangement which forces men to pay dues in order to work in our plants, the union will continue to use collective bargaining machinery to coerce and intimidate the men into paying dues. That has been happening under the contract we had with the CIO union for 2½ years. I recognize the necessity for collective bargaining procedure to handle grievances . . . But we are unwilling to have collective bargaining procedure used as a racket to keep our plants in a constant turmoil for the purpose of strictly CIO union activities . . . It is not necessary to have a strike in our plants in order to get fair treatment for our employes."

A dismal picture of events inside and outside plants during the past few weeks is given by H. L. Weckler, in charge of Chrysler operations. He reports:

Inside and outside the plant the claim of collective bargaining has been distorted into a systematic, organized campaign to control the individual employe, to dictate how much work he does and to force him by intimidation and threats of violence to do the union's will. Inside the plant this sort of thing is carried on by an army of "white button" stewards working under shop committee men and district committee men who defy the factory management and tell foremen what the men will and will not do. Outside the plant it is carried on by flying auto squadrons of CIO agents who so intimidate the men that they are afraid to do their

Welding Chevrolet Frame to Flooring

■ **Channel section steel frame, assembled separately, here is being welded to ribbed steel flooring, later to become an integral part of the box section main frame of 1940 Chevrolet models**

work for fear of violence to themselves and to their families.

For several days shop stewards and other union men have forced to the curb corporation trucks and vendors' trucks carrying materials to the Mound road Dodge plant and have threatened the drivers with violence, "at their homes" or otherwise, if they would not take their loads back to the garage and get off the road.

Due to the disruption of interplant transportation by truck, the corporation was forced to load materials for the Mound road plant on freight cars. Vendors did likewise. Pickets then prevented the railroad from spotting cars at unloading platforms inside the plant gate and forced the switch-engine crew to abandon cars in such a way as to block closing the gate. Until railroad police came on the scene and protected a crew spotting the cars, material had to be hand trucked to the production line in order to keep the plant operating.

Several automobiles filled with CIO agents stopped a truck loaded with frames from Midland Steel Products Co. and told the driver to take his load back; this he did. Later, four truckloads of material, one from Columbus, Ind., arrived at the Dodge truck plant. Pickets forced two to turn back; the other two got by and went inside.

New Union Functionaries

Inside the plants, under the guise of collective bargaining machinery, shop committee men, district committee men and "white button" stewards, formed groups which directed orders down to each individual employe. At times these union functionaries at Dodge reached the total of 750 men who exercised control over some 20,000 production employes. This exceeds the total number of superintendents, assistant superintendents, foremen and assistant foremen.

"White button" stewards apparently are a new form of UAW-CIO subofficial. They have no standing officially in contracts, but they provide the machinery by which the union exercises control of practically every operation in the plant. They are strange creatures, with no firm tenure of office, wearing the "white button" one day and not the next. They work with committee men in passing orders around to employes and then report back how they have been obeyed. And they also are empowered to collect dues from members who have been remiss in this matter.

The number of "white button" stewards, according to Mr. Weckler, varies by district and from time to time. On the average, there is one for every 30 employes. The district committee man passes along the production lines at times convenient for delivering the latest instructions. He learns how the particular department stands, who is following orders and who is not, who has paid his dues and who is in arrears, who has disparaged the union, or who needs a little strengthening in the interest of "solidarity."

Plant washrooms have become centers for dispatching of instructions to employes on the line, and all the various committee men participating in these "jam sessions" naturally expect and receive full hourly pay, resulting in an exhorbitant amount of "idle" time on the company payrolls.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1937	1938	1939
Jan.	399,186	226,952	356,950
Feb.	383,900	202,597	317,517
March	519,022	238,447	389,489
April	553,231	237,929	354,263
May	540,377	210,174	313,214
June	521,153	189,402	324,235
July	456,909	150,450	218,478
Aug.	405,072	96,946	103,343
Sept.	175,630	89,623	192,672
9 mos.	3,954,480	1,642,520	2,570,161
Oct.	337,979	215,286	.....
Nov.	376,629	390,405	.....
Dec.	347,349	406,960	.....
Year	5,016,437	2,655,171	.....

Estimated by *Ward's Reports*

Week ended:	1939	1938†
Oct. 7	76,095	33,165*
Oct. 14	75,860	43,540*
Oct. 21	70,114*	59,860*
Oct. 28	78,210*	65,335*
Nov. 4	82,690	75,830

†Comparable week.

	Week Ended Nov. 4	Oct. 28
General Motors	44,105	40,375
Chrysler	960	1,445
Ford	21,825	20,950
All others	15,800	*15,440

*Revised.

■ TRENDS in automotive materials and designs were discussed intimately by editors and General Motors technical experts at a recent luncheon in New York prior to the auto show there. Plastics came in for considerable comment and the opinion was expressed that they were well adapted for insulation and decorative purposes but not for structural parts. Little possibility was seen for the substitution of lighter metals for steel in production automobile bodies, since in the future the body will be designed to function structurally; in other words, the trend being toward chassisless designs in which the body itself is the frame and support of the car.

Air conditioning was not believed to be adaptable to passenger cars as yet, for the reason that present equipment is too heavy, requiring 4 to 5 horsepower and circulation of around 2000 cubic feet of air per minute.

Contrariwise, it is interesting to note Packard has designed and built a complete mechanical refrigeration air cooling system, operating in conjunction with a heating system and air conditioning unit which provides year-round treatment of air entering the car. The device is now offered as a standard, factory-installed extra cost accessory. Refrigerating coils are located behind the rear seat in an air duct, with heating coils in another compartment of the same duct. An electrically driven fan forces air through either set of coils at the option of the driver, the filter operating as air travels through the duct.

Treated air follows along the top of the car so that it does not blow directly on any of the passengers. It returns along the floor, passing under the rear seat to the coils for recooling or reheating. Compressor is mounted on top of the engine and is driven from the radiator cooling fan. The plant has a cooling capacity of 1½ tons at 60 miles per hour, 2 tons at 80 miles per hour, refrigerating plants being rated at the equivalent quantity of ice they are capable of producing in 24 hours.

General Motors engineers consider wider adoption of glass insulation as a prospect for future designs, Cadillac already using the material in generators. Glass insulation is said to permit generator operating temperature 50 to 60 degrees higher, but involves complications, such as wire connections. On some buses, connections to generators are being welded.

The day of rear engines in passenger cars is still distant, according to present opinion, principally because the public appears to be prejudiced against them as a result of the false feeling of security realized in sitting behind the engine and away from the front or impact area of the car. Mechanical difficulties involved in rear engine designs, adding appreciably to costs, are a further deterrent.

■ PUBLIC favor for Ford models equipped with the 60-horsepower engine has reversed the trend exhibited last year, and the proportion of 60 engines to 85 engines being built has mounted rapidly, now being somewhere around 1 to 3, whereas a year or so ago the larger engine was favored by a margin of 7 or 8 to

(*Please turn to Page* 80)

"We light-conditioned our office to provide comfortable, easy seeing with G-E MAZDA Lamps."

R. J. HIMMELRIGHT, *treasurer of Monarch Rubber Company, tells how simple it is to have BETTER LIGHT*

"AFTER being handicapped by bad lighting for years, we were surprised to find how simple it was to make our office a comfortable and easy place to work with better lighting," says Mr. Himmelright of the Monarch Rubber Company, Hartville, Ohio.

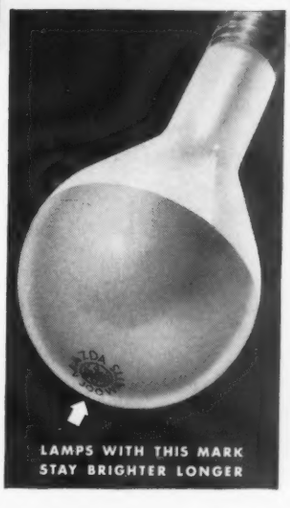
An interesting feature of the new lighting installation is a new steel ceiling construction which directs the light from the fixtures downward in parallel beams. Thus a maximum of the available light falls on the working area. In addition, what light does strike the side walls is well diffused because of the good reflection quality of the color used on the side walls.

Work goes easier and faster in a light-conditioned office like this. Fatigue is reduced. Efficiency is increased. For a free copy of a valuable booklet, "Light for Seeing in the Office," write General Electric Company, Dept. 166-S-K, Nela Park, Cleveland, Ohio.

ABOVE—300 watt G-E Silvered Bowl MAZDA lamps in modern fixtures direct light to the new style steel ceiling, which re-directs it downward on the desk tops where the intensity is more than 20 foot-candles.

* * *

AT RIGHT—G-E Silvered Bowl MAZDA lamps are regular MAZDA lamps with a coating of "mirror" silver on the bowl. Like all G-E MAZDA lamps, these silvered bowl lamps *stay brighter longer.*



G-E MAZDA LAMPS

GENERAL ELECTRIC

MEN OF INDUSTRY

■ FREDERICK J. GRIFFITHS has been appointed executive vice president, Copperweld Steel Co., Glassport, Pa., in charge of the newly formed steel division. The past three years he has been president, Griffiths-Bowman Engineering Co. From 1914 to 1926 Mr. Griffiths was associated with Central Steel Co. in positions ranging from general superintendent to president. From 1926 to 1929, during which time Central was merged with Republic Steel Corp., he was chairman of the board, Central Alloy Steel Corp. Subsequently he became president, Republic Research Corp., and Timken Steel & Tube Co., and a director of Timken Roller Bearing Co. Mr. Griffiths at present is a director, Eaton Mfg. Co., Cleveland Graphite Bronze Co., of Cleveland, and Aetna-Standard Engineering Co., Youngstown, O.

♦

C. S. Patton, manager of equipment sales, Alco Products division of American Locomotive Co., New York, has been appointed sales manager of that division. After graduation from Cornell university with the degree of mechanical engineer in 1918, he was associated with the shipbuilding industry in various capacities, for eight years. Subsequently he became New York manager for the Biggs Boiler Works Co., Akron, O., and later was in charge of sales of fabricated plate work for the Heat Transfer Products Co., which position he held after the company was acquired by American Locomotive Co.

♦

Terry Fisher, for many years associated with Cutler-Hammer Inc., Milwaukee, as sales engineer in the Middle West, has been appointed to

C. S. Patton

take charge of the northern Indiana territory, with headquarters in South Bend, Ind.

♦

Harold E. Milz has been appointed chief engineer, Mercury Mfg. Co., Chicago. Mr. Milz joined Mercury in 1926 and the past 13 years has been engaged in engineering problems pertinent to industrial truck, tractor and trailer design.

♦

Henry A. Lardner, since 1913 vice president, J. G. White Engineering Corp., New York, has been elected president, United Engineering Trustees, New York, joint agency of the four national societies of civil, mining and metallurgical, mechanical and electrical engineers. He succeeds D. Robert Yarnall, Philadelphia.

♦

Ralph S. MacPherran, for many years chief chemist of Allis-Chalmers Mfg. Co., Milwaukee, is retiring from active service. Associated with the company since 1895, having started with the former E. P. Allis Co., Mr. MacPherran is noted as a metallurgist in the field of gray iron. In 1931 he was awarded the J. H. Whiting gold medal of the American Foundrymen's association.

Harold J. Stein, research engineer of the manufacturing department, has been appointed director of research, chemistry and metallurgy in all Allis-Chalmers' manufacturing departments. His assistant will be J. T. Jarman. Mr. Stein joined the firm as a graduate student apprentice in 1916.

♦

Cecil Knights, sales representative of Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating equipment and supplies, has been transferred from the Chicago to the Detroit office. H. E. Moyer has been named Los Angeles sales representative with headquarters at 4324 South Normandie avenue, Los Angeles.

♦

Charles Buff, Buff Companies Inc., Schenectady, N. Y., has been elected president, Capital district chapter, Institute of Scrap Iron and Steel Inc. Other new officers: Vice president, Walter Cohen, R. Cohen & Son, Glens Falls, N. Y.; secretary, George Hess, Trojan Scrap Iron Corp., Troy, N. Y.; treasurer, Emanuel Kline, Estate of Morris Levin, Albany, N. Y.

♦

Frank G. Peterson, assistant chief clerk, Donora, Pa., works of American Steel & Wire Co., has been promoted to the comptroller's staff, to take charge of new accounting developments for all Donora plants. Other changes in personnel at Donora include promotion of G. E. Koedel, from Cleveland, to the position of assistant chief clerk with special duties in Donora, and Law-

Terry Fisher

Ralph S. MacPherran

Harold J. Stein

rence J. Rittinger, who has been chief production and stock clerk for the wire and zinc works, to assistant chief clerk. R. A. Riddle has been appointed assistant to the manager of the safety, casualty and pension department of American Steel & Wire at Cleveland, succeeding Mr. Koedel.

♦

Henry D. Rolph, associated with Yale & Towne Mfg. Co., Stamford, Conn., over 30 years, has been appointed director of export sales, with headquarters in the Chrysler building, New York. He formerly was general manager, Velbert division of Yale & Towne, Velbert, Germany. Mr. Rolph will serve as director and adviser on export sales and operations, not only for Continental plants but for those in Stamford, Philadelphia, Chicago and Canada.

♦

Dave Nassau, for 29 years general manager, St. Louis branch of Federated Metals and its predecessor company, Great Western Smelting

Dave Nassau

& Refining Co., has been named vice president in charge of production, Duquesne Smelting Corp., Pittsburgh, recently organized. Charles M. Kepner, has been made a vice president and foundry service engineer. He formerly was foundry service manager for Federated Metals in the Pittsburgh district. Mitchell Jacobs has been made a vice president and manager for the company's eastern division, with headquarters in New York. The past 25 years Mr. Jacobs was New York sales representative for Federated and the former Great Western Smelting & Refining Co. G. E. Alderson, metallurgical and plant engineer for Federated Metals since 1920, will be the new company's chief engineer and metallurgist.

♦

George E. Stringfellow, vice president and division manager, Edison Storage Battery division of

Henry D. Rolph

Thomas A. Edison Inc., West Orange, N. J., announces the following changes in that organization:

C. B. Archibald, formerly with the railroad sales staff in Chicago, has been named manager of the St. Louis district, succeeding the late D. F. O'Donnell; E. W. Allen, heretofore sales engineer at West Orange, has been appointed to the newly created position of manager of engineering; W. M. Schleicher, formerly assistant to Mr. Allen, has been promoted to sales engineer; W. H. Patterson, chief engineer, continues as head of the factory engineering department; J. E. Schmidt, superintendent of manufacturing, has been appointed to the newly created post of manager of the production department, and will head a consolidation of the former manufacturing and sales production departments.

♦

W. M. Hayes, Detroit district manager of Air Reduction Sales Co. the past 13 years, has joined the sales organization of P. R. Mallory & Co., Indianapolis. He is a charter member of the Engineering Society of Detroit, also a member of the Society of Automotive Engineers and the American Welding

W. M. Hayes

Society, serving as an officer of the latter group for several years. He will concentrate his activities in the Central West.

♦

John F. McComb, since September, 1937, assistant sales manager, wire division, Continental Steel Corp., Kokomo, Ind., has been named sales manager, merchants trade sheet division for the company's Kokomo and Indianapolis plants. A. C. Huber, since July, 1931, assistant sales manager, manufacturers' sheet division, has been appointed sales manager of that division. Hoyt Shepard, the past nine years assistant sales manager of the sheet division, has been made assistant to the general sales manager. W. Paul Irwin continues as sales manager, Superior Sheet Steel Co., Canton, O., a Continental subsidiary.

DIED:

■ CHESTER C. BOLTON, congressman from Ohio, who was prominent in industry as well as government. in Cleveland, last week, as result of a heart ailment. Fifty-seven years of age, Mr. Bolton was in his fifth term as a Republican representative. Before entering politics he was a junior executive of Bourne-Fuller Co., Cleveland, and throughout long public service he maintained close contact with industry's problems as director in Cleveland-Cliffs Iron Co., Lamson & Sessions Co., Payne-Bingham Co., Standard Tool Co., and Perry-Payne Co., all of Cleveland.

♦

Paul G. Hoppe, vice president, Kempsmith Machine Co., Milwaukee, in that city, Oct. 25.

♦

G. Harold DeGarmo, 51, assistant superintendent, Niles, O., tin plate mill of Republic Steel Corp., Oct. 28 in Youngstown, O.

♦

Albert I. Sanger, 87, Oct. 15 in Cleveland. He was active in the iron and steel scrap business in Cleveland 40 years and helped organize the firm of Sanger & Harris.

♦

Frank M. Turner, a director, Oliver Iron & Steel Corp., Oct. 15. Since 1902 he had served as superintendent of the Allegheny & South Side railroad at the Oliver corporation.

♦

Otto Agricola, 74, leading Alabama industrialist, Oct. 18 at his home in Gadsden, Ala. He was president, Agricola Furnace Co., A. & J. Mfg. Co., First National Bank of Gadsden and was interested in other Alabama manufacturing companies.

September Steel Exports Up 32%

■ EXPORTS of iron and steel products in September, excluding scrap, totaled 244,933 gross tons, 32 per cent larger than 185,182 tons shipped in August, according to the metals and minerals division, department of commerce. September exports were valued at $15,481,546, compared with August value of $13,391,234. In September, 1938, exports were 196,368 tons, valued at $11,142,216.

In nine months this year total exports, excluding scrap, were 1,516,988 tons, slightly less than 1,585,187 tons in the corresponding period, 1938. However, value this year was $111,268,825, while in the same period in 1938 the value was $105,901,894.

Canada, taking a total of 54,270 tons, was by far the leading purchaser in September, the most important items being 13,170 tons of skelp, 7032 tons of nonalloy black steel sheets, 6827 tons of plain shapes, 5484 tons of tin plate, 4913 tons of nonalloy plates and 3402 tons of nonalloy strip.

Japan was second best buyer, 23,452 tons, including 11,391 tons of nonalloy ingots, 7999 tons of alloy ingots, and 1937 tons of nonalloy bars.

Pig Iron Leads Exports

Pig iron was first in point of tonnage, 28,192 tons; 11,240 tons to Sweden, 8450 tons to the United Kingdom, 4651 tons to Norway and 2896 tons to Canada. Tin plate exports totaled 27,111 tons.

September scrap exports were 330,680 gross tons, compared with 291,896 tons in August, values being $5,100,069 and $4,399,583, respectively. In September, 1938, scrap exports were 145,090 tons valued at $2,051,761. Japan was the largest purchaser, 178,826 tons. The United Kingdom was second with 85,527 tons, Italy 29,452 tons, Canada 18,914 tons, and Poland and Danzig 8919 tons.

In nine months this year scrap shipments totaled 2,761,594 tons valued at $40,842,079, against 2,177,839 tons valued at $33,796,147 in the comparable period, 1938.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	Sept. 1939	Aug. 1939	Jan. thru Sept.'39
Pig iron	28,192	9,214	71,360
Ferromanganese and spiegeleisen	329	27	541
Other ferroalloys	462	504	1,778
Ingots, blooms, etc.:			
Not containing alloy	13,283	4,960	77,079
Alloy, incl. stainless	8,035	111	14,762
Steel bars, cold fin.	807	1,354	6,147
Bars, iron	74	41	488
Bars, concrete	3,205	3,091	23,200
Other steel bars:			
Not containing alloy	16,460	7,029	89,305
Stainless steel	8	15	235
Alloy, not stainless	434	882	9,142
Wire rods	1,829	1,477	17,615
Boiler plate	1,673	988	6,031
Other plate, not fab.:			
Not containing alloy	20,268	19,371	180,956
Stainless steel	9	33	93
Alloy, not stainless	686	181	1,866
Skelp, iron or steel	13,172	9,039	30,432
Sheets, galv. iron	427	526	4,364
Steets, galv. steel	8,491	9,886	71,100
Sheets, "black" steel:			
Not containing alloy	20,171	26,426	198,541
Stainless steel	72	41	665
Alloy, not stainless	242	408	2,593
Sheets, black iron	775	727	5,385
Strip steel, cold-rolled:			
Not containing alloy	1,434	2,076	14,293
Stainless steel	42	41	494
Alloy, not stainless	39	60	351
Strip steel, hot-rolled:			
Not containing alloy	5,332	7,682	40,550
Stainless steel	.....	10	228
Alloy, not stainless	5	9	50
Tin plate, taggers' tin	27,111	27,169	175,499
Terne plate	590	591	3,458
Tanks, except lined	1,121	1,661	18,788
Shapes, not fabricated	19,409	8,771	79,927
Shapes, fabricated	2,461	2,983	23,484
Plates, fabricated	490	377	3,257
Metal lath	134	121	833
Frames and sashes	107	113	773
Sheet piling	1,531	1,339	6,244
Rails, 60 lbs.	615	1,252	28,951
Rails, under 60 lbs.	492	459	3,255
Rails, relaying	1,887	1,454	12,618
Rail fastenings	1,928	192	7,421
Switches, frogs, crsgs.	103	96	1,641
Railroad spikes	300	156	2,262
R. R. bolts, nuts, etc.	158	95	1,133
Boiler tubes, seamless	593	773	5,403
Boiler tubes, welded	173	35	465
Pipe:			
Seamless casing, oil-line	6,766	5,773	46,451
Do., welded	634	372	3,140
Seamless black	673	641	5,631
Pipe fittings:			
Mall. iron screwed	394	317	2,858
Cast iron screwed	171	193	1,758
Pipe and fittings for:			
Cast iron pressure	4,802	2,449	20,470
Cast iron soil	1,053	1,218	6,778
Pipe, welded:			
Black steel	1,196	1,215	12,258
Black wrought iron	307	483	2,779
Galvanized steel	3,111	1,369	16,294
Galv. wrought iron	258	199	2,226
*All other pipe & fitgs.	418	597	3,727
Wire:			
Plain iron or steel	2,640	2,940	20,286
Galvanized	2,067	1,516	18,449
Barbed	4,964	3,449	32,857
Woven-wire fencing	509	202	2,409
Woven-wire sc'n cloth:			
Insect	32	35	319
Other	89	66	940
Wire rope and cable	399	171	2,783
Wire strand	119	72	737
Electric welding rods	96	89	1,075
Card clothing	.....	2	28
Other wire	842	578	5,820
Wire nails	1,482	1,726	14,348
Horseshoe nails	83	70	654
Tacks	20	32	202
Other nails, staples	352	431	3,170
Bolts, mach. screws	757	570	5,952
Castings:			
Gray iron (incl. semi-steel)	185	279	2,497
Malleable iron	49	24	674
Steel, not alloy	113	100	844
Alloy, incl. stainless	42	116	1,114
Car wheels, tires, axles:			
† Wheels and tires	945	1,247	7,872
† Axles, no wheels	231	273	7,277
† Axles, with wheels	3,281	718	7,044
Horseshoes and calks	3	22	152
Forgings, n. e. s.:			
Not containing alloy	634	1,697	8,627
Alloy, incl. stainless	57	85	1,432
Total	244,933	185,182	1,516,988
Scrap, iron and steel	327,724	290,346	2,741,334
Scrap, tin plate	1,637	977	8,175
Tin plate circles strips, cobbles, etc.	587	162	5,225
Waste-waste tin plate	732	411	6,860
Total scrap	330,680	291,896	2,761,594
GRAND TOTAL	575,613	477,078	4,278,582
Iron ore	149,007	147,196	655,762

*New class. Includes flanged malleable cast iron fittings, expansion joints and riveted pipe and fittings.
†New class.

Pennsylvania in Bid for Industries

■ PENNSYLVANIA is making an aggressive attempt to attract new industries. To this end. the state commerce department has purchased space in national magazines to advertise a change in the state government's attitude toward industry, reduction in governmental and relief costs, its relatively low tax rates and the commonwealth's natural industrial advantages. It also has published and distributed an attractive brochure on the state's industrial advantages.

Other states have advertised to attract industries. stressing low tax rates, market advantages, availability of factory sites and factories, and in some cases have offered special inducements to new industries.

Pennsylvania's sales effort emphasizes "Something has happened in Pennsylvania." The "something" is explained as Gov. Arthur H. James' administration, "sympathetic and eager to help business and the worker. Its aims: To create more jobs in private industry, cut down the number of jobs supported by taxes."

Gets Good Results

Successes claimed since the administration's inauguration in January:

State payrolls cut 17 per cent.

Administrative expenses cut 20 per cent.

Reduction of 175,000 in relief rolls, from Jan. 7 to June 3. Most of these were absorbed by private industry.

State employment service found new jobs for 66,861.

Industry spent $32,000,000 for expansion in the first six months.

Lowest per capita debt of any large eastern industrial state, relatively low real estate taxes, no general sales tax and no personal income tax also are offered as arguments why industries should locate in the Keystone state.

In addition to the more co-operative attitude of government, the state department outlines physical advantages for industry: Proximity to raw materials; abundance of fuel and power; availability of industrial sites; adequate transportation facilities; location for market and distribution; a home market of 10,000,000 people; an ample supply of skilled and common labor.

"When industry prospers," says Gov. James, "payrolls grow longer and pay envelopes fatter. Labor will benefit, and I cordially invite it —and expect it—to join in this co-operative effort."

What's New at Pittsburgh . . .

By R. L. HARTFORD
Pittsburgh Editor, STEEL

■ NEW Fretz-Moon butt-weld pipe mill will be installed at Wheeling Steel Corp.'s Benwood, W. Va., works. Present mills include three butt-weld and four lap-weld. Butt-weld now is produced in sizes up to 3 inches. Lap-weld pipe is produced up to 12½ inches. Present capacity for butt-weld is 108,000 tons annually, while the lap-weld mills are rated at 150,000 tons annually.

New unit will be built adjacent to the 14-stand continuous skelp mill, which is rated at 208,000 tons annually. A second skelp mill at the company's Steubenville works is rated at 132,000 tons annually.

Contracts have been placed for a new 100 x 650-foot mill building. According to the company, the installation "will place the corporation on a parity with other large pipe manufacturers and the process assures uniform pipe length and an improvement in pipe quality."

♦

To Roll Aluminum Foil

Down in Louisville, Ky., a new concern has been formed to roll aluminum into foil. The company, to be known as Cochran Foil Co., has ordered from Lewis Foundry & Machine division, Blaw-Knox Co., complete rolling facilities for the production of several million pounds of aluminum foil annually.

Aluminum strip in widths up to 27½ inches and from 0.040 to 0.062-inch gage will be rolled to 0.00025-inch on the two-high mills. New developments in precision rolling and new automatic controls have been embodied in the mills. Running at speeds up to 600 feet per minute, the mills will roll with gage variations of less than 1/40,000-inch, according to their designers.

Each will be a separate unit, individually driven from a Ward-Leonard variable control, with automatic acceleration and deceleration. Electrical tension has a range from 0 to 1300 pounds, selectively variable and automatically controlled. The mills are equipped with enclosed pinion stands and drives, automatically lubricated. They will roll on antifriction bearings.

Motors range from 40 to 100 horsepower, are connected to helical gear drives through flexible couplings. Self-contained power plant will house the control panels and motor generator sets for each mill, all set up for selective or automatic control. Mills have been designed to synchronize through electrical tie-ups so as to maintain smooth production while operating at varying speeds.

♦

Forge Shop Expansion

Mesta Machine Co. has started work at the West Homestead plant preparatory to enlarging the forge shop. Floor space will be increased by an addition to the building, requiring about 200 tons of structural steel. Some new equipment will be required.

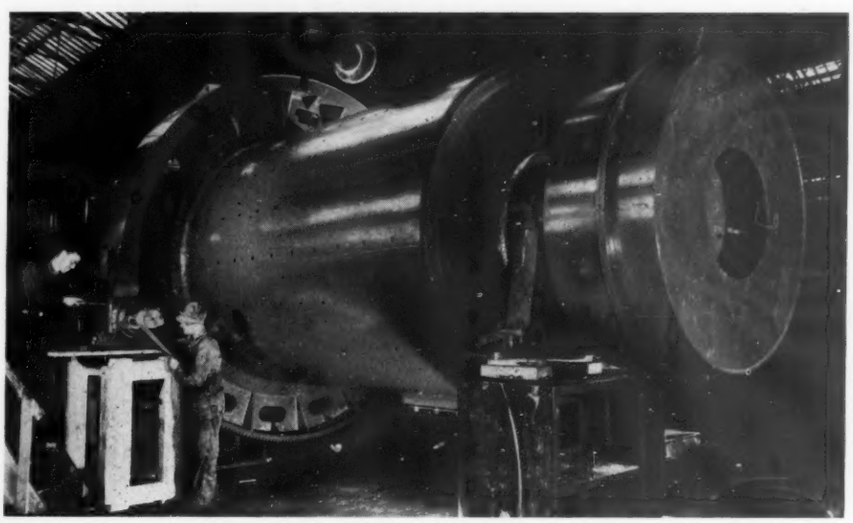
♦

Plans Furnace Installation

Carnegie-Illinois Steel Corp.'s Vandergrift works will install three new electric annealing furnaces, to be used in processing electrical sheets. Units will be installed in one of the present buildings, will enhance the plant's functions as the specialty sheet division of Irvin works.

Orders soon will be placed for equipment, which will supplement present facilities, increasing the plant's silicon sheet capacity. Additional expenditures probably will be made at the Vandergrift works soon to improve operations on the hot mills.

Forty-Four-Ton Slag Mill for Shasta Dam



■ **Shop assembly view of large slag mill shipped by Allis-Chalmers Mfg. Co., West Allis, Wis., to Columbia Construction Co. for disintegrating clay and other undesirable material in preparing concrete aggregate for the Shasta dam project in California. It is 8 feet in diameter, 11 feet long, and completely assembled weighs 88,000 pounds**

General Electric Honors Its Workers

■ General Electric Co., Schenectady, N. Y., in the October issue of its *Monogram*, commemorating the firm's sixty-first anniversary, pays tribute to employes' achievements.

Lauding the faith, determination and ingenuity of its manpower in exploring the unknown, General Electric reviews their accomplishments in developing today's high-efficiency low-priced filament lamp from Edison's original creation to save the American public an estimated $3,000,000,000 annually in current alone. Every G-E feat in electricity is related as a story written in terms of men.

Imposingly arrayed are honorary awards conferred on personnel by outside organizations. G-E workers have won the Nobel Prize; Faraday Medal of the Institution of Electrical Engineers of Great Britain; Perkins Medal of the American Society of Chemical Industries; Edison Medal of the American Institute of Electrical Engineers; Congressional Medal; others in legion.

Company itself has presented its highest honor, the Charles A. Coffin award, to 508 in the past 17 years. During the last 20 years it has paid to employes $1,000,000 for 75,000 adopted suggestions.

World Tin Stocks Gain

■ World stocks of tin at the end of September totaled 39,001 gross tons, an increase of 4393 tons over 34,608 tons at the close of August, according to the International Tin Research and Development council, The Hague. Total stocks at the close of September, 1938, were 52,768 tons.

Editorial

Keep the Cards on the Table

■ AMERICAN business has succeeded in wiping out numerous misconceptions in the public mind regarding its supposed "mysteries" by the simple expedient of releasing to the public true facts as to its operations.

While not necessarily "operating in a goldfish bowl," as suggested by General Hugh Johnson, in the days of the NRA, it is true that the major industries of the United States—through their associations—have during the past several years done a splendid job of combating antibusiness propaganda, by keeping the actual figures regarding their operations clearly before the public.

There has been considerable misconception lately as to the effect of the war in Europe on the level of business here in America. Too much credit for the current upswing is being given to war orders, and not enough credit is given to a substantial and far more desirable revival of domestic business which began even before the outbreak of war in Europe. This is true particularly in the capital goods industries.

Wrong Conclusions Might Bring Trouble that Frankness Can Avert

Unless the true facts are understood, several undesirable things are likely to happen. One is that politicians are going to agitate for more governmental control of business on the ground that the national defense situation is being impaired by undue attention to foreign business generated by war activities abroad, activities in which, theoretically at least, we properly should play no active part.

Another thing that may happen is that domestic customers—good substantial customers yesterday, today and tomorrow—are liable to gain the impression their constructive needs are temporarily being forgotten by suppliers who are supposedly being hypnotized by the glitter of quick riches involved in destructive needs abroad.

A third and even more ominous possibility is that labor in certain industries will get the impression that a carnival of quick profits is under way, in which it should participate through big wage increases. There already are signs that something of this kind may be in the wind.

Hiding of Facts Causes Suspicion And May Reverse Public Confidence

One of the surest ways to head off any of these unfortunate eventualities is for business to continue in its policy of taking the public into its confidence. One of the surest ways to invite trouble is to show signs of reversing this policy of open operations. When any formerly open operations are covered up, the immediate reaction is that the facts are such that the industry is ashamed of them and does not want the public to know the truth.

This immediately leads to assumptions which are far more harmful to the standing of the industry before the bar of public opinion than the true facts possibly could be.

It is to be hoped that just at a time when so-called "big business" seems at last to be succeeding in re-establishing itself in public favor, and even to some degree in government favor, nothing in the way of suppression of figures by any branch of industry will serve to start the sensitive pendulum swinging back toward the conditions of misunderstanding, suspicion and distrust which admittedly did exist not so many years ago.

The BUSINESS TREND

Rate of Industrial Activity Moves to Higher Levels

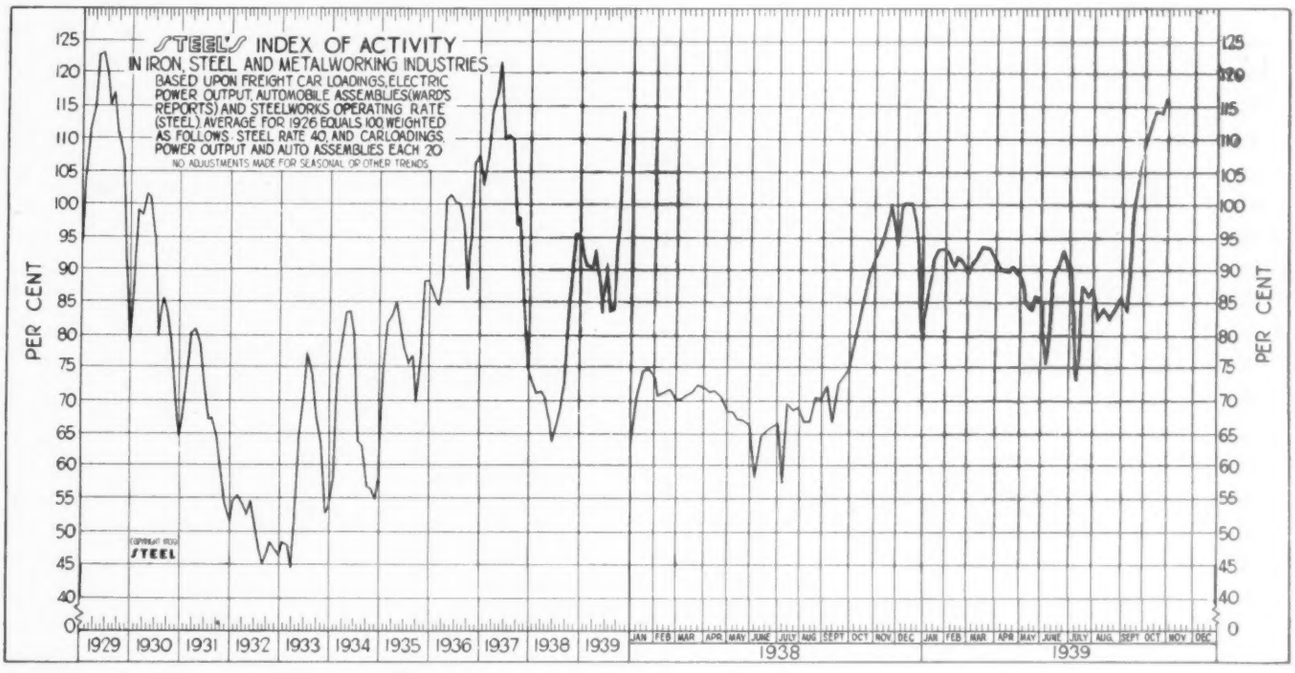
■ REFLECTING the continuation of the sharp upward trend of industrial activity in the iron, steel and metalworking industry throughout October, STEEL'S index average for the month rose 16.0 points to 114.0. This represents the highest level touched by the monthly index since May, 1937, the peak month of the 1936-1937 recovery movement. In October last year the index average was 83.6.

Despite a more than seasonal decline in freight traffic, STEEL'S weekly index advanced to 116.2 during the week ended Oct. 28. This compares with 113.6 recorded in the preceding week. In the corresponding week a year ago the index stood at 91.4.

Since the outbreak of the European war the weekly index rose from 83.7 recorded during the week ended Sept. 9 to 116.2 for the latest period ended Oct. 28, a gain of 32.5 points during the brief two month period.

Volume of new business placed during the past month did not keep pace with the large volume of orders booked in September. However, new orders are coming in at a good rate, thereby swelling order backlogs in some lines to the point where deliveries are now extended well into the first quarter of next year.

Of considerable interest to industrial leaders is to what extent the rate of consumption is keeping pace with the rising production schedules. In considering the


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL). AVERAGE FOR 1926 EQUALS 100 WEIGHTED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939
1938
1939

STEEL'S index of activity advanced 2.6 points to 116.2 in the week ended Oct. 28:

Week ending	1939	1938
Aug. 12	83.9	66.9
Aug. 19	82.2	70.5
Aug. 26	83.4	70.3
Sept. 2	86.3	72.3
Sept. 9	83.7	66.8
Sept. 16	97.5	72.9
Sept. 23	103.0	74.0
Sept. 30	107.9	74.9
Oct. 7	112.5	78.9
Oct. 14	113.9	84.3
Oct. 21	113.6†	88.7
Oct. 28	116.2	91.4

†Revised.

Mo. Data	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.		95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.		95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

inventory situation it should be kept in mind that stock of manufactured goods were at a sub-normal level during the summer months. Steel producers report that their customers are pressing for deliveries, which would indicate that inventories of steel are not being excessively accumulated in the hands of consumers and distributors.

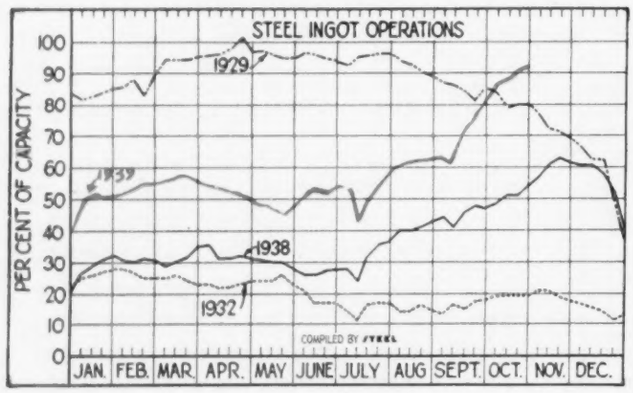
Whether or not inventories will be excessive two or three months from now will be determined to a considerable degree by the rate of improvement in the expansion of consumption during the intervening period. Undoubtedly the trend of industrial activity during the early part of next year will depend to a certain extent on the movement of finished products at that time.

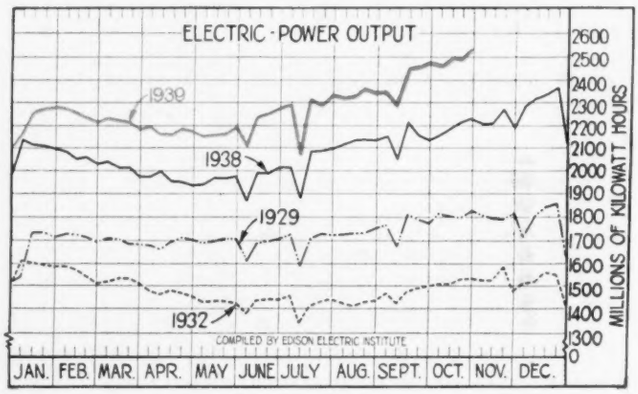
AUTOMOBILE OUTPUT GAINS SEASONALLY

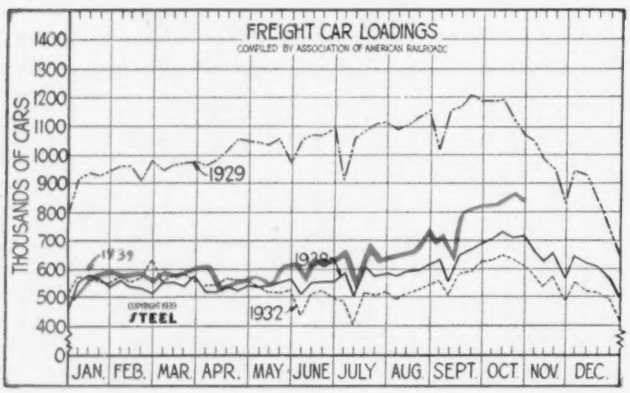
Total production of automobiles and trucks in the United States and Canada during September recorded a seasonal increase as builders stepped up operations on the new models. September output totaled 192,672 units, compared with 103,343 during August and 89,623 in September, 1938. During the first nine months this year production aggregated 2,570,161 units, while in the corresponding 1938 period assemblies totaled 1,642,520. Despite disruption of operating schedules in some automotive plants throughout October, resulting from labor trouble, assemblies for the month are estimated at nearly 300,000 units.

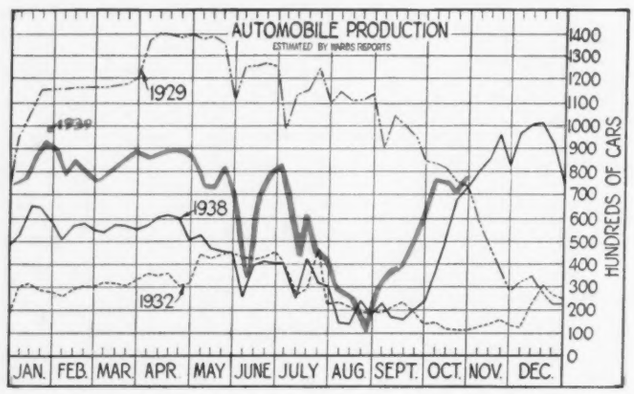
RAILROAD EARNINGS UP SHARPLY

Net operating income of Class I railroads during September rose to the highest level since October, 1936. Reflecting the sharp upturn in freight traffic during September, net operating income in that period recorded a substantial increase to $86,435,178. This represents a return on investment of 2.9 per cent and compares with net operating income of $50,406,298, or 1.69 per cent on invested capital, in September, 1938. In August this year net operating income totaled $54,586,246. Net operating income for the first nine months this year amounted to $205,444,845, or 1.1 per cent return on invested property. This is a substantially better showing than recorded during the first three quarters of the preceding year.

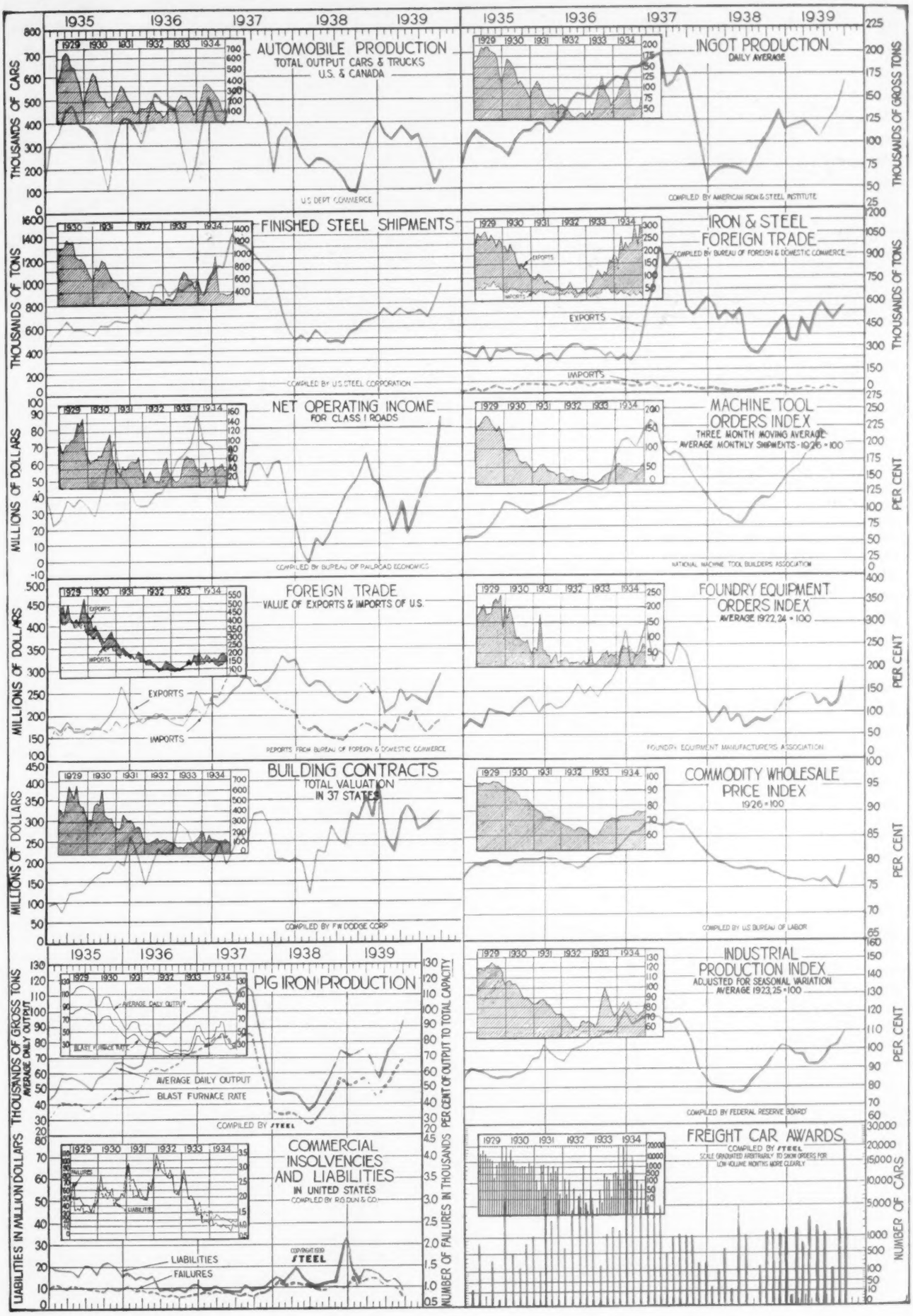


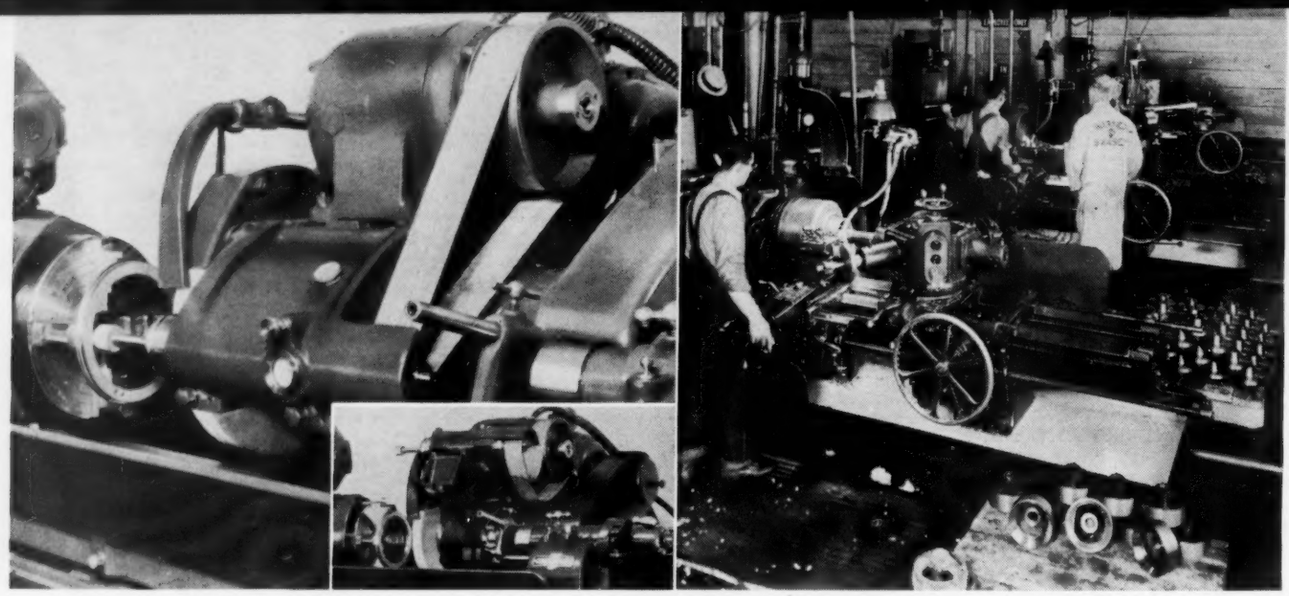






Week ending	Steelworks Operating Rate Per Cent 1939	1938	1932	1929	Electric Power Output Million KWH 1939	1938	1932	Freight Car Loadings Thousands of Cars 1929	1939	1938	1932	1929	Weekly Auto Output 1939	1938	1932	1929
July 15	50.5	32.0	15.5	95.5	2,234	2,084	1,415	1,727	674	602	504	1,079	61,610	42,010	29,870	115,075
July 22	56.5	36.0	16.5	96.0	2,295	2,085	1,433	1,723	657	581	502	1,101	47,420	32,070	46,375	123,512
July 29	60.0	37.0	16.5	96.0	2,342	2,094	1,440	1,725	660	589	511	1,104	40,595	30,390	22,461	110,163
Aug. 5	60.0	40.0	14.5	94.0	2,325	2,116	1,426	1,730	661	584	497	1,091	28,250	14,771	23,591	114,364
Aug. 12	62.0	40.0	14.5	93.0	2,333	2,134	1,415	1,733	661	589	512	1,100	24,875	13,790	21,162	111,939
Aug. 19	63.5	41.5	15.5	90.0	2,368	2,139	1,431	1,750	674	598	518	1,136	12,955	23,940	19,568	111,902
Aug. 26	63.5	43.5	14.5	89.0	2,355	2,134	1,436	1,762	689	621	538	1,160	18,365	18,700	19,896	113,316
Sept. 2	64.0	44.5	13.5	87.5	2,357	2,149	1,464	1,675	722	648	561	1,017	25,240	22,165	19,561	90,913
Sept. 9	62.0	41.5	15.5	86.0	2,290	2,048	1,423	1,806	667	569	501	1,153	26,865	17,485	21,586	104,351
Sept. 16	74.0	46.0	15.0	84.5	2,444	2,215	1,476	1,792	806	660	587	1,166	41,245	16,100	23,116	100,042
Sept. 23	79.5	48.0	17.0	82.0	2,449	2,154	1,490	1,778	815	676	596	1,202	53,950	20,390	19,327	95,453
Sept. 30	84.0	47.0	18.0	85.0	2,470	2,139	1,499	1,819	835	698	622	1,179	62,755	25,405	13,265	83,201
Oct. 7	87.5	48.5	19.0	84.0	2,465	2,154	1,506	1,806	835†	703	625	1,179	76,095	37,665	14,568	82,088
Oct. 14	89.5	51.5	19.5	79.0	2,495	2,183	1,507	1,799	845	727	650	1,186	75,860	50,540	12,675	81,882
Oct. 21	91.0	51.5	19.5	80.0	2,494	2,214	1,528	1,824	861	706	642	1,134	70,114	59,860	11,165	76,870
Oct. 28	92.0	54.5	19.5	80.0	2,539	2,226	1,533	1,816	834	709	617	1,072	78,210	65,335	11,117	73,048


AUTOMOBILE PRODUCTION
TOTAL OUTPUT CARS & TRUCKS U.S. & CANADA
U.S. DEPT. COMMERCE
INGOT PRODUCTION
DAILY AVERAGE
COMPILED BY AMERICAN IRON & STEEL INSTITUTE
FINISHED STEEL SHIPMENTS
COMPILED BY U.S. STEEL CORPORATION
IRON & STEEL FOREIGN TRADE
COMPILED BY BUREAU OF FOREIGN & DOMESTIC COMMERCE
EXPORTS
IMPORTS
NET OPERATING INCOME
FOR CLASS I ROADS
COMPILED BY BUREAU OF RAILROAD ECONOMICS
MACHINE TOOL ORDERS INDEX
THREE MONTH MOVING AVERAGE
AVERAGE MONTHLY SHIPMENTS 1926 = 100
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
FOREIGN TRADE
VALUE OF EXPORTS & IMPORTS OF U.S.
REPORTS FROM BUREAU OF FOREIGN & DOMESTIC COMMERCE
FOUNDRY EQUIPMENT ORDERS INDEX
AVERAGE 1922-24 = 100
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION
BUILDING CONTRACTS
TOTAL VALUATION IN 37 STATES
COMPILED BY F.W. DODGE CORP.
COMMODITY WHOLESALE PRICE INDEX
1926 = 100
COMPILED BY U.S. BUREAU OF LABOR
PIG IRON PRODUCTION
AVERAGE DAILY OUTPUT
BLAST FURNACE RATE
COMPILED BY STEEL
INDUSTRIAL PRODUCTION INDEX
ADJUSTED FOR SEASONAL VARIATION
AVERAGE 1923-25 = 100
COMPILED BY FEDERAL RESERVE BOARD
COMMERCIAL INSOLVENCIES AND LIABILITIES
IN UNITED STATES
COMPILED BY R.G. DUN & CO.
LIABILITIES
FAILURES
COPYRIGHT 1939 STEEL
FREIGHT CAR AWARDS
COMPILED BY STEEL
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
THOUSANDS OF CARS
THOUSANDS OF TONS
MILLIONS OF DOLLARS
THOUSANDS OF GROSS TONS
PER CENT
NUMBER OF CARS
LIABILITIES IN MILLION DOLLARS
THOUSANDS OF GROSS TONS AVERAGE DAILY OUTPUT
PER CENT OF OUTPUT TO TOTAL CAPACITY
NUMBER OF FAILURES IN THOUSANDS



MODERN MACHINE

By GUY HUBBARD
Machine Tool Editor

■ AT A time when so much is being said about the boosting of production through sensational increases in cutting speeds and feeds, there is some danger of losing sight of the fact that certain other factors in modern machine tool practice are equally important in promoting improved efficiency. One of these factors is material handling within the machine tool itself.

Material handling usually is thought of as some form of transportation in and around the plant —trucking, lifting and moving by crane, hoisting, etc. It is only necessary to study some machine tools of years gone by to see that their designers had not caught onto the fact that the principles of efficient material handling likewise could be and should be designed into machine tools. Much of the inconvenience of old fashioned machine tool was due to deficiencies in their material handling ability.

Sensational as modern metal cutting processes are, it still is true that the putting of the raw material into a machine tool and the subsequent removal of the finished part must be done somehow, either by the operator directly or by some mechanical means controlled by the operator. If this putting in and taking out operation—which is material handling pure and simple—is not properly provided for, it is very likely to eat up machine and operator time far in excess of that consumed by the actual cutting process.

Parkhurst Wire Feed

One of the first points at which internal material handling in machine tools was tackled by designers was the matter of gripping the work while it was being machined. The turret lathe for bar work was not highly effective, and the automatic screw machine was not practical at all, until the invention of the Parkhurst wire feed. Variations of this ingenious device for feeding stock without stopping the spindle are today among the most interesting details in turret lathes, screw machines, and multiple spindle automatics.

In some of the latter, the stock actually is fed out "on the fly", during the infinitesimal period during which the spindle carrier is indexing. The split second saving thus effected may seem like a very small economy, but by the end of the day it adds up into a substantial figure. Capable production men think of time in terms of money, and under conditions as they are today time in the shop is too expensive a commodity to waste. That is why in many cases it is being metered just as carefully as is electrical energy.

Slow Chucking Is Expensive

While old fashioned, slow methods of chucking can still be tolerated in the job shop and in the tool room where small lots of work are handled, they certainly have no place in the production shop where big lots are the rule. There they are comparable to a muzzle-loading gun on a modern battle field. As a matter of fact, some of the ingenious magazine feeding attachments which are now applied to modern machine tools might well be compared to modern quick-firing magazine guns in speed and efficiency.

One principle on which many successful machine designers now work is: "Once the machine has hold of the piece, don't let it go until every possible operation has been accomplished". This is reflected by the ingenious tools which have been devised to turn behind shoulders, to undercut within bores, to ream from within the machine spindle, etc. One comparatively simple, but at the same time thoroughly ingenious example of this technique is given by the Cincinnati grinder setup shown in Fig. 1.

In this case a ring is to be ground on a part of its periphery and also bore ground. Ordinarily this would require two machines, with the consequent double setup. This is avoided by the use of a hinged internal grinding attachment on a cylindrical grinder. After having ground out the bore, this attachment is merely swung up out of the way and latched, thereby allowing the main grinding wheel to go into action on the periphery—and on the face of the work if desired. By this means, not only is unnecessary material handling eliminated but also the exact relation between bore and periphery is preserved.

The use of hydraulic or pneumatic power for chucking, in place of "elbow grease" is also doing a great deal toward improving the material handling characteristics of modern machine tools, at the same time relieving their operators of irksome physical strains. Consider for example the Warner & Swasey setup shown in Fig. 2. This photograph, which was taken in the shop of the

Fig. 1 (Left)—Secondary material handling is eliminated in this Cincinnati grinder by an internal grinding attachment mounted on a hinge so that it can be swung up and out of the way to permit the external or face grinding wheel to go into action without disturbing the chucking of the work. Fig. 2 (Right)—Warner & Swasey turret lathe as applied to mass production of slush pump valve seats, demonstrates how pneumatic chucking can solve the material handling problem where quick, accurate chucking, powerful gripping and instant release are essential

cutting indicated by the volume of coolant which is flowing.

Station-type machines, which previously were dealt with in the Oct. 9 issue of STEEL (Pages 40 and 41) as far as certain other aspects were concerned, are deserving of close attention by production men on account of the effective methods of material handling which they embody. One type which can be considered as falling within this category, but which was not dealt with in the article just mentioned, is the production surface grinder with revolving table.

One of these machines is shown in action in Fig. 3. This Blanchard rotary table automatic grinding machine is surface grinding the sides of the crankshaft bearing ends of Chrysler connecting rods—and is capable of performing this operation at the rate of 360 rods per hour.

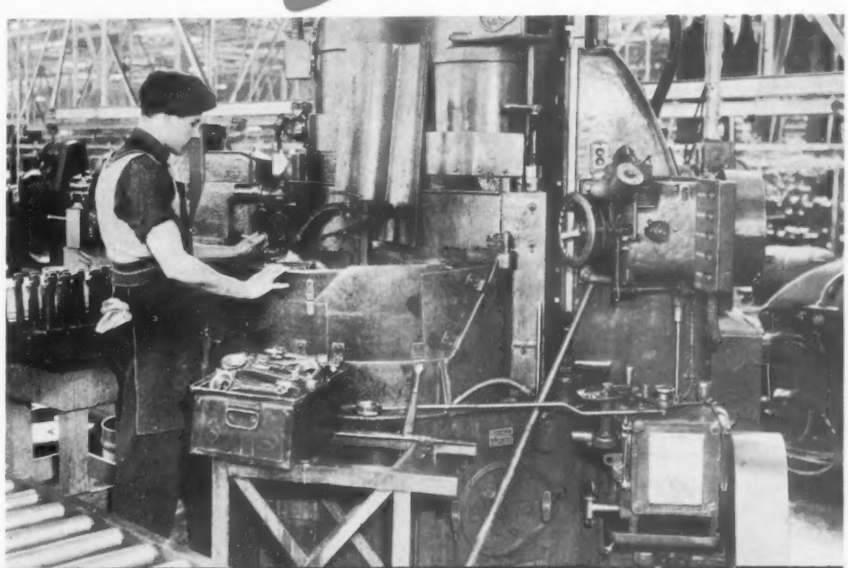
Aside from the fact that this is a rigid and high-powered machine tool, this rapid production is made possible by the manner in which the work is fed under the face of the wheel and returned to the operating position by the power driven revolving chuck. There is no lost motion on the part of the operator—no "chasing the work around". In

(*Please turn to Page* 79)

E TOOLS EMBODY EFFECTIVE *Material Handling*

Mission Mfg. Co., Houston, Tex., depicts the machining of slushing pump valve seats on a production basis.

By an ingenious arrangement of tools these tough alloy steel forgings are machined at one setting. The important point from the standpoint of this article, however, is the method by which they are held during machining. This is accomplished by a powerful, quick-acting pneumatic chuck by which these parts are instantly gripped and centered, held rigidly and positively against the heavy pressure of the cuts, and then instantly released. Loading and unloading is only a matter of seconds and entails no exertion on the part of the operator other than seating the piece and flipping a valve handle. In this case older methods of chucking, entailing heavy work with a wrench and questionable pressures on the work, might easily cancel out all the savings effected by the high speed of



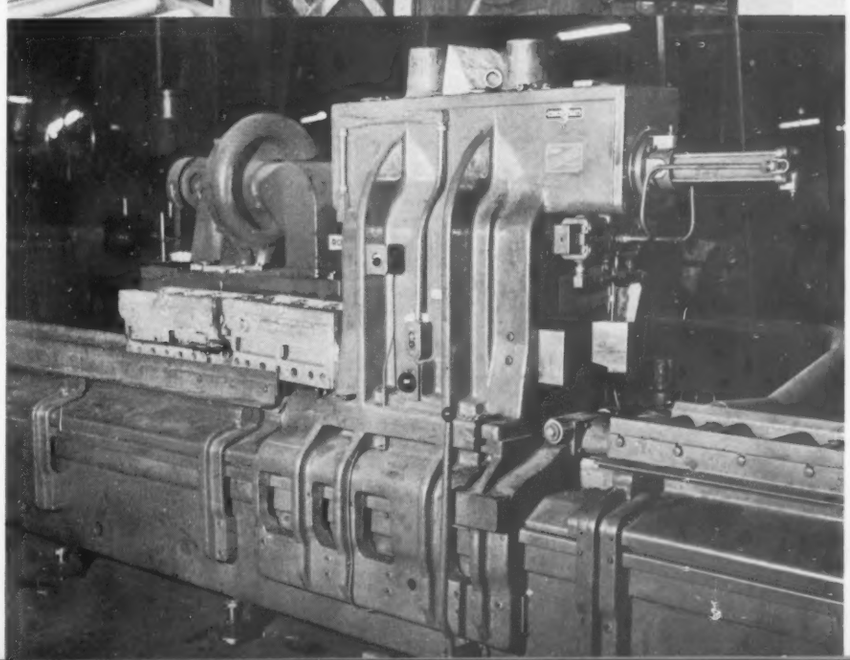


Fig. 3 (Upper)—The revolving chuck often is the answer to the material handling situation, as in this high powered Blanchard grinder which is set up for grinding the sides of crank pin ends of Chrysler connecting rods. Fig. 4 (Lower)—In the case of this Cincinnati hydraulic broaching machine for heavy machining operations on Studebaker cylinder blocks, the built-in material handling elements represent a very considerable percentage of the special engineering in this machine

Developing a *Smaller* Automobile Transmission

Lessons learned in weight reduction studies on helical gear transmissions are applicable to many other fields. Methods used to increase capacity and life at the same time reducing weight and cost of the unit are detailed here

By G. L. ROTHROCK
Cadillac Motor Car Division
General Motors Corporation
Detroit

■ ALTHOUGH making of helical gear transmissions for automobiles is only about eight years old, these eight years have brought marked advances in transmission design and manufacturing skill which have reduced sizes, weights and costs, at the same time maintaining high standards of quietness and durability.

Helical gears focussed attention of designers upon the helix angle as little was known about strength, durability and effect of additional loads imposed by this type of gear in automotive service.

At first, the available steel warped excessively in heat treatment and did not cut smoothly. Gears were finished by grinding. Costs were high.

Now new finishing processes such as lapping and shaving together with entirely revised and improved standards of accuracy, allow the engineer to refine designs to an extent undreamed of only a few years ago. Many of these refinements are of much general interest since they involve a new angle of approach to the old subject of weight and cost reduction.

The cumulative effect of such light weight mechanical units is not entirely appreciated. For example, a lightweight transmission will first of all allow a slight reduction in motor weight with less power for acceleration. With less power, weight of clutch, rear axle and other units may be reduced. When all units have been reduced to their minimum, motor requirement becomes still less, and so on as the weight reduction cycle is repeated to produce a most significant total cumulative reduction.

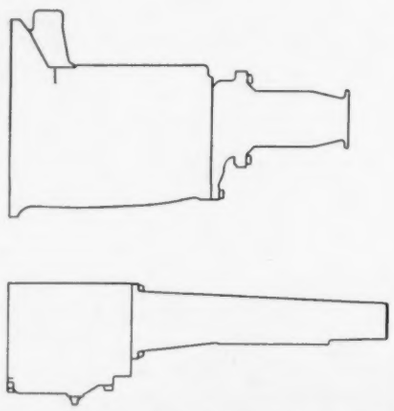


Fig. 1—This sketch shows reduced size of the present transmission

This same principle may be utilized to advantage in design of industrial units. Progress along this line often may be reflected in substantial savings.

Fig. 1 shows two transmissions side by side to indicate relative sizes. The larger weighs 150 pounds and was used on all Cadillac-La Salle cars in 1932 and on all Cadillacs made at Cadillac Motor Car division, 2860 Clark street, Detroit, until recently. The smaller is now used throughout the Cadillac-La Salle line. Its weight is 76 pounds.

Weight Reduced One Half

Origin of this transmission was a still smaller one weighing 67 pounds and designed to transmit a torque of 170 foot-pounds in a 4000-pound car. As will be detailed, capacity of this small transmission was increased 67 per cent to 300 foot-pounds while its weight was only increased to 76 pounds, or 13 per cent. Now it is used successfully in a 5500-pound car. Compared with the original helical gear transmission, it weighs about one half as much but possesses equal or improved durability and torque capacity.

The dynamometer used in this development consists of a V-16 motor

Abstract from paper presented at annual meeting of American Gear Manufacturer's association, Virginia Beach, Va., May 15-17, 1939.

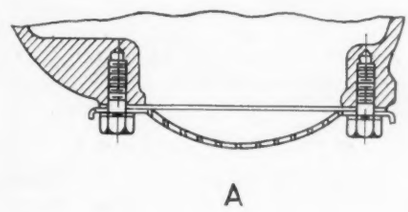
connected through the transmission under test to a large marine-type transmission to obtain a high output speed to drive a water brake which absorbs the power generated. Output torque is measured by a balance beam on the water brake.

Tests are made under conditions of constant torque at 1500 revolutions per minute with oil temperatures maintained at 60 degrees Fahr. by water-cooling. Test is continued until failure occurs or until life exceeds maximum requirements. In three years of development work, 139 transmissions were run until a failure occurred.

Experience shows that if a unit transmits full torque under laboratory test conditions for the equivalent of 140 miles in low, 420 miles in second gear and 560 miles for the constant mesh gears, that unit will give no trouble in the field.

First tests with the dynamometer equipment were run with an input torque of 250 foot-pounds. Three tests in low gear showed uniformly low life, failure in each case starting in the fillet at front end of low mainshaft gear tooth and extending diagonally across the tooth face. This indicated definitely that load was not distributed evenly over whole tooth surface but was highly concentrated at the front end.

This case differed from others tested in that the cover was located on bottoms in place of on top. Cover was a 1/16-inch thick sheet steel stamping instead of the usual iron casting. Since a weakness here might permit the case to deform under load and throw the gears out of



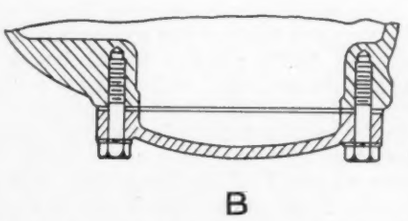


Fig. 2—The cover at bottom of case was changed as shown here

alignment, a rigid cast iron cover with dowel screws was substituted for the sheet metal as shown in Fig. 2.

Tests which followed showed an improvement of 64 per cent in gear life from this change. However, failure was same as before with fracture still starting at front of low mainshaft gear.

To correct this, two changes were made. Contact pattern of the teeth was changed by relapping to give a heavier bearing under light load at the front end of the tooth instead of the usual center bearing. The other change separated the low gear portion of the countershaft gear from the reverse idler portion. This weakened that portion of the countershaft gear which contacted the front end of the mainshaft gear tooth, thus allowing a uniform deflection and better distribution of the load. Fig. 3 illustrates this change.

These last two changes give a further improvement of 85 per cent in gear life, but failure occurred in low mainshaft gear as before. All these tests were with transmission in low position.

Gears used were cut in the experimental shop and lapped on a ma-

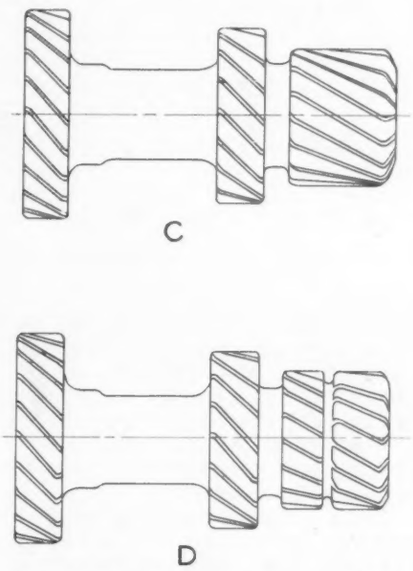


Fig. 3—Changing counter gear design as shown here also increased life of unit

chine. In production work, gears usually show slightly different tooth contact character and increased life due to better control of heat-treatment distortions and resulting improvement in tooth shape.

Tests on production gears using the design developed above showed 12, 14 and 20 hours respectively. Since minimum requirement in low gear is 140 miles, equivalent to 2.6 hours on this test, there is a factor of safety of 12 to 2.6, or 4.6 to 1. On three later production gear tests, 20 hours on each test were completed without failure. Thus ample life was obtained for the low gearing.

Next a series of tests was conducted in second gear using 250 pounds input torque also. It was expected these tests would be satisfactory since stresses are 12 per cent lower than in low gear and since the case was improved by the stiffer cover.

However, life fell short of expectation as second counter gear tooth failed in the same fashion on three successive tests. Although tooth alignment seemed better than on low gears as indicated by wear

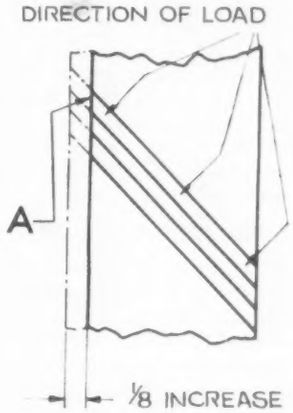


Fig. 4—Showing acute angled edge of tooth where trouble was experienced

pattern on tooth surfaces, it was observed that tooth fracture started on the front end of the tooth.

One reason for failure may be seen in Fig. 4. The fracture started at the acute angled edge of the tooth designated by A, even though this sharp edge had been chamfered as was regular practice. To get additional strength here, ⅛-inch of material was added as a buttress to the overhanging edge of the tooth as shown by the dotted line in the sketch. This change was made in the second counter gear only, the mating mainshaft gear remaining unchanged.

Subsequent tests showed an improvement of more than 100 per cent due to this change as only one gear failed in four tests.

Two failures of countershaft head gear had the fracture start at the acute angled end of the tooth so ⅛-inch of material was added here, too. No further failures were experienced at this point, even though the length of the test was extended 59 per cent.

Failures now occurred in the clutch connection gear. Fractures were similar to those of the countershaft head gear, starting in the fillet at rear end of the tooth. However, there was no acute angle here, so it could not be strengthened in the same manner as the two previous gears. The solution seemed to be to improve the alignment by strengthening the clutch gear shaft against bending. This was done by increasing the diameter of the shaft in the

neighborhood of the ball bearing from 1⅜ inches to 1 9/16 inches. A 10 per cent improvement resulted, but location and type of failure remained unchanged.

However, two tests of 26 and 20 hours' duration gave an ample factor of safety over the 7-hour minimum requirement for head gears, so tests were concluded and the transmission used in all 1937 Cadillac and La Salle cars with the exception of the V-16.

While a factor of safety of 4.6 to 1 for the low gears and 3.5 to 1 for the head gears may seem much greater than necessary, it actually was not excessive. This safety factor seemed essential since test results showed extremely wide variation, some as high as 3.7 to 1. Earlier tests were even more erratic.

Wide Variation in Life

This wide variation in life experienced was disturbing since a design must be predicated on the basis of shortest-life gear. It then follows that the longest gear life may be ten times as long as necessary since one group of tests showed life of one gear to be ten times that of another, even though the gears were absolutely identical. Also it follows that if the life of the short-lived gear could be prolonged, the capacity of the transmission could be increased directly in proportion to the increase in life of this gear.

Here, thus, was a possibility of increasing the transmission capacity to the point where it would be ample for the V-16 motor which had a maximum torque of 300 foot-pounds. Stepping up the capacity from 250 to 300 foot-pounds, an increase of 20 per cent, likewise increased tooth bending stresses at the same rate.

Computed tooth bending stresses, however, are not true stresses as actual stresses are much higher and occur at such focal points as end of fillet or at sharp edges or scratches in the fillet caused by gear cutter. Consequently, any scheme for improving gear life must be based on reducing these stresses.

Tooth contact area is the critical factor. Axle gears are held to within 200 per cent variation compared with 1000 per cent for helical gears as tooth contact can be maintained accurately due to lack of tooth distortion existing in helical gears.

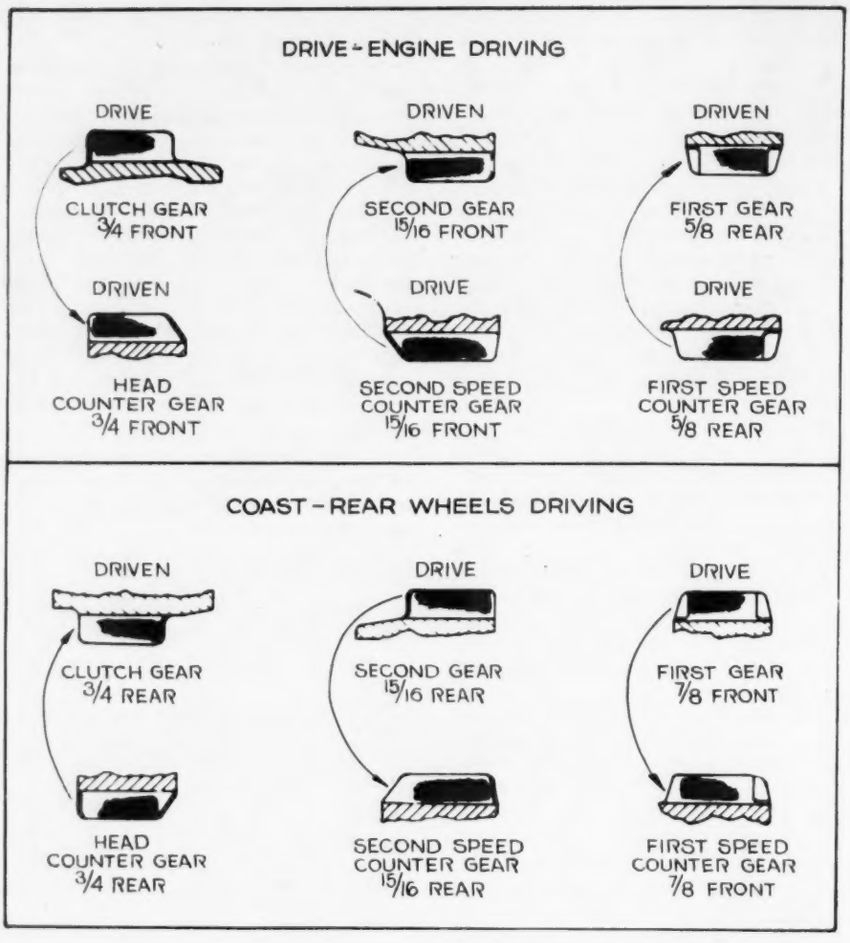


Fig. 6—These are desired contacts on lapped and matched gears. The desired contacts shown are made under light load on test stand. Length of contact must not vary more than plus or minus ⅛-inch from figures given

Critical To Misalignment

Helical gear teeth differ from spiral bevel gear teeth in that they cannot be designed to allow for slight misalignment without concentrating the load at the extreme end of the tooth as can spiral bevel gears. Accordingly, helical gears are much more critical to misalignment as the smallest error in tooth alignment results in extreme concentration of the load at the end of the tooth. To explore possibilities of reducing misalignment, a deflection test was set up, Fig. 5. Transmission was mounted in usual way to a motor cylinder block with torque applied by turning the crankshaft while universal joint shaft at rear of transmission was held against turning. This allows deflections to be taken under normal drive and coast conditions.

Deflection of gear due to load may

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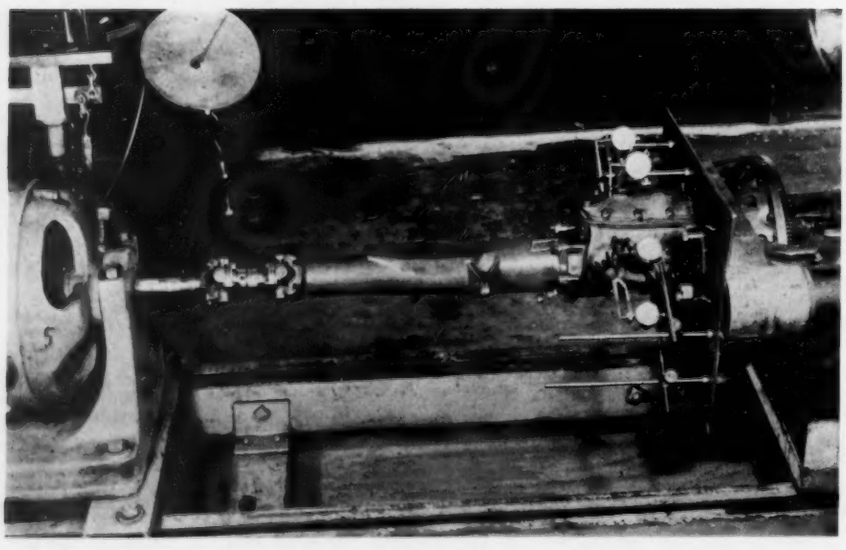
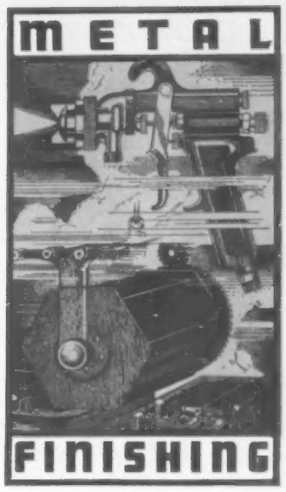
Fig. 5—Setup employed in making the deflection tests





pH Papers

New method of checking pH values appears to have many advantages; is fast, simple and accurate; requires no laboratory-trained operator. Matching color of bars with indicator bar instantly gives reading. Strips available in many ranges for all types of work

By **PAUL FRANK**
456 Fourth avenue
New York

■ FOR BEST results in electroplating, cleaning, rustproofing, enameling and similar work in processing and finishing metal surfaces, one of the important factors is accurate control of the active acidity or alkalinity of the solution.

Much attention has been paid lately to the importance of *active* acidity or alkalinity as denoted by the pH value. pH stands for concentration of hydrogen ions in a solution and differs from quantitative acidity or alkalinity as determined by other measurements. While acidity and alkalinity refer to the composition of a solution, whether made up principally of acid or alkaline substances, pH denotes *active* acidity or alkalinity.

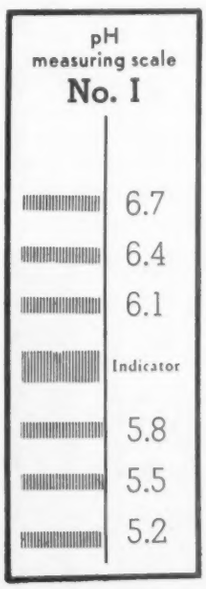
It is the concentration of hydrogen ions denoted by the pH value that exercises so great an influence on most processes and not the mere state of being acid or alkaline. Optimum results can only be obtained in most processes by operating at a definite and closely controlled pH value.

Color Tells pH

While there are a number of methods for measuring pH values, there are few as simple and convenient and at the same time as accurate and dependable as the use of pH papers. This is a comparatively recent development and promises much to simplify checking of pH values.

In this method, strips of special paper, impregnated with a highly sensitive indicator bar and a number of control bars in various colors, are used. Each bar is of a different color or shade and represents a definite pH value. When these strips are dipped into the solution for a few seconds, the indicator changes color. (Length of time required depends largely upon the salt contents of the solution.) Then by examining the color of the control bars to see which matches the color of the indicator bar, the pH value can be read off instantly as each color bar represents a definite pH value.

There are a number of important advantages in use of this method. Its use may be of especial interest in industrial applications because



Appearance of a typical pH paper strip used to check pH values

the operator need not be a technician to do his own testing accurately by this method. For field work, the pH paper method is a most convenient tool.

Simplicity, perhaps, is the most important advantage of this method. No apparatus or indicator solution is required. The strip of paper does the entire job. There is no need to take samples. The test can be made right at the container. The pH papers come in handy boxes containing 200 strips of a number. Any particular number paper extends over a pH range of 1.5 or more. It is claimed that the papers will not deteriorate with age.

Used in Colored Solutions

Colored solutions can also be tested correctly (for instance bright nickel solutions which are of a deep green). Since the indicator and the control-colors are on the same pH strip and are being dipped into the solution simultaneously, they would be equally affected by a colored solution, and thus the effect of coloring upon the correct reading will be cancelled out automatically.

These papers are available in a variety of standard numbers for the more common ranges and they can be made to meet any special requirements where such special manufacture is warranted.

Appearance of a typical pH paper is shown in the accompanying illustration. In use, the strip is dipped into the solution and the color bar which assumes the same color as assumed by the indicator bar shows the pH value of the solution. Typical of the range of values covered by these papers are those in Table I. This illustrates the pH values and range for the Series A pH papers developed for buffered solutions. Their sensitivity is a ca.0.05 pH. They are furnished with one indicator bar and six or eight control bars on each strip. Control colors show pH values in steps of 0.2 or 0.3 pH. In-between values can be estimated.

In addition, pH papers are available in a number of other series including a universal strip which is practical for preliminary tests and suffices also where extremely ac-

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Clamshell Buckets

New type of clamshell bucket features power-accelerating toggle links which greatly improve closing power, an important consideration when handling iron ore. Also links guide scoop members, permitting a more protected design

By E. L. HARRINGTON
Chief Engineer
Bucket Department
Blaw-Knox Co.
Pittsburgh

■ RECENTLY a new approach has been made in design of those clamshell buckets used primarily for handling iron ore. Perfected recently by Blaw-Knox Co., Farmers Bank building, Pittsburgh, this design is particularly suited to that type of hoist which requires the load to be lifted on two parts of line. Installations of this type require that the closing line, after being reeved through the bucket, be returned to a dead-end anchorage at the trolley or the bridge. This method of operation is commonly termed "fleet-through" operation because, under these conditions, the closing line literally does fleet through the bucket during hoisting or lowering, as well as during closing and opening.

There is a particular problem encountered in meeting the requirements of this type of installation. It involves obtaining adequate closing power for efficient performance in the handling of iron ore while avoiding, at the same time, an excessive number of sheaves within the bucket over which the closing line has to pass. It is generally conceded that a six-part reeving of the closing line within the bucket (three parts effective from the standpoint of closing power) represents the maximum allowable for fleet-through operation. This characteristic limitation, imposed by hoisting the load on a two-part line, introduces the need for an acceleration of the closing power as the bucket approaches a closed position.

Toggle links thus are employed in the new bucket to attach the upper structure to the rear of the scoops in such a manner that the force exerted through these toggle links greatly increases the "biting power" as the bucket approaches a closed position. This enables the bucket, in spite of limited reeving, to bite through heavily compacted ore.

A distinctive feature of this new design is that the toggle links are employed to perform another function in addition to their natural acceleration of closing power. Their movement in relation to the upper

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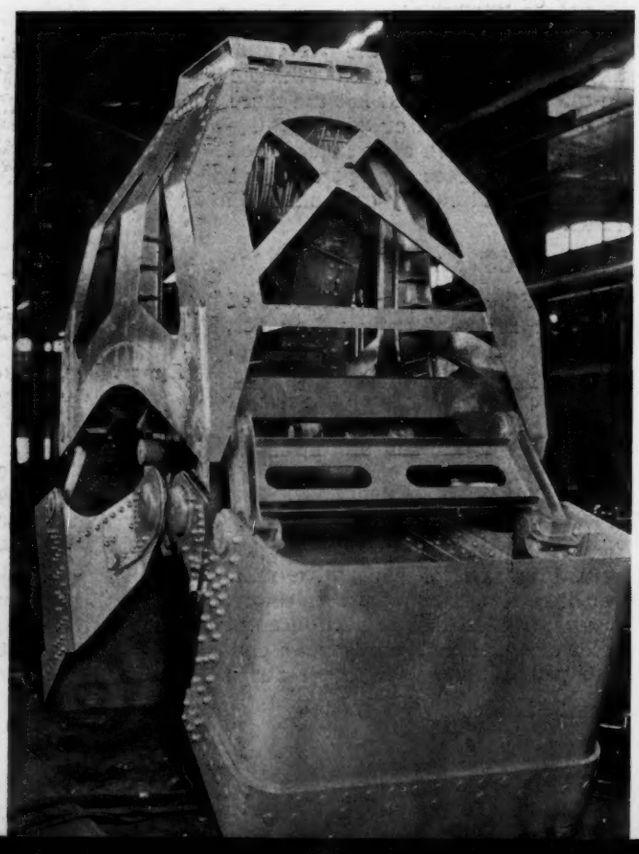

At left, new unit in operation lifting a load. At right, shop view of same unit with jaws open, showing toggle linkages employed

THE TIE THAT BINDS US TO COMFORTABLE OLD FRIENDS IS STEEL!

Everyone has a favorite pair of really comfortable shoes --- worn until the leather is thoroughly pliable, the shoes wholly comfortable. Ever stop to think that steel makes that possible? The average pair of shoes has 94 pieces of steel---which hold the shoe together, give it long life, make the modern shoe comfortable-- --in fact make it possible.

Almost everything in life today depends on steel--the clothes we wear, our transportation, the buildings we work in, the appliances that make modern life easier are of steel or made by steel machinery.

Not, of course, just any steel. The nails in your shoes are one type of steel, the tin-plated steel for packaging food is another, the sheet for your automobile body is a third. Youngstown maintains a great research department to make certain that on every order you place with us you will get the steel which will meet your requirements, and will help you produce a better product, at more profit to you.

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THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

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25-15B

Tool Steels Bright Hardened in New Type Gas Atmosphere Furnace

■ BRIGHT hardening of tool steels, hardenability of tool steels, tempering of high speed steels, effect of air humidity on steel during heating, hardness conversion relationships and transformation phenomena of steels, provided interesting subjects for technical papers presented at sessions of the American Society for Metals at its annual meeting in Chicago, Oct. 23-27, during the twenty-first National Metal congress. Last week, STEEL reviewed a number of the early general sessions, a report which is concluded herewith. In an early issue will be presented a resume of the three-session symposium on precipitation or age hardening of metals.

A new method for bright hardening tool steels, particularly the air hardening type, without decarburization or distortion was described by J. R. Gier and Howard Scott, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The process, developed by the authors' company, involves use of a specially-designed electric furnace employing a mixture of hydrogen and nitrogen prepared by passing ammonia in the state of a pure anhydrous liquid through a dissociator. This atmosphere, called "Ammogas," is maintained in the furnace in a high state of purity as regards both carbon dioxide and water vapor. The gas, the authors declared, in inert to carbon in steel and so highly reducing that oxidation does not occur with any steels. Even high chromium alloys and stainless steels can be bright hardened without tarnish.

Chamber Has Gas Lock

Heating chamber of the furnace is protected from contaminating brickwork gases by a gas-tight muffle. A water-cooled gas lock or purging chamber at the front end permits moving work in and out without harm to the atmosphere. Die blocks or tools are placed on a tray in the entrance chamber for 15 or 20 minutes while the gas contaminated by air is exhausted. The tray next is moved into the heating chamber and held for the desired time—preheating, it was stated, is possible but not essential or even desirable. Finally, it is drawn into the water-jacketed zone for cooling and removed when cold.

Cooling in the atmosphere for hardening does not produce appreciable temperature gradients and the rate is so slow that distortion does not occur, yet is fast enough to give full hardening, the authors stated. Thermal conductivity of the special atmosphere is said to be 5½ times that of air, thus enabling thicker steel sections to be hardened in the gas than in air. Since cracking is the result of residual stresses induced by rapid quenching, the low-temperature gradients of the gas in critical ranges keep residual stresses to a negligible intensity.

The authors reported that a considerable number of dies for regular shop production have been hardened to 64 Rockwell C or higher on exposed surfaces without cracking and without complaints from the operating divisions using them. Through use of curves developed with the process final dimensions of dies can be calculated in advance with certainty.

Investigates Hardenability Test

A belief that the hardenability test when applied to tool steel apparently permits more intelligent selection than all other test methods ordinarily considered, was expressed by A. J. Scheid Jr., general metallurgist, Columbia Tool Steel Co., Chicago Heights, Ill. An investigation made by Mr. Scheid indicated that as we move up in the established types of tool steel from carbon steels to the higher performance and safer steels, the difference in the steels is explained by the difference in surface hardening effect plus hardenability (or depth hardening) until high speed steel is reached where red hardness is an added quality.

From hardenability values derived, it is apparent that standard tensile, compression and impact test results, which in small size specimens are closely related to hardness values, cannot indicate the physical properties in tool size specimens. However, these physical properties are apparently predictable in tool size specimens from the composite hardness readings taken from hardenability curves.

Mr. Scheid also showed that from the hardenability values derived, it is apparent that tool life (for initial grinds, regrinds and ultimate performance) which is a function of wear resistance which, in turn, is related to indentation hardness tests, can be predicted from hardenability curves. Furthermore, from the hardenability values, it is apparent that distortion, commonly evidenced by warpage and shrinking, resulting from quenching tool steel and caused by the lower displacement of material of reduced hardness can be predicted from hardenability curves.

Justification for use of a simple reference scale of hardness for reporting all penetration hardness test values no matter which of several testing instruments are used was obtained in an investigation made by Howard Scott, section engineer, and T. H. Gray, research department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Finding that reliable conversion relations between Rockwell and diamond pyramid hardness test values can be obtained on heat treated steels independent of composition, the investigators prepared hardness conversion tables for the major hardness tests.

The diamond pyramid test, having the best characteristics of accepted tests for a reference standard, was used for the linear reference scale of a scalar conversion table. This table permits conversion from a test value by any one of the following tests to any other: Diamond pyramid; Rockwell C, A, 15-N, 30-N and 45-N; Scleroscope; Monotron; and Brinell.

Tests on sintered carbides showed that relation between Rockwell and diamond pyramid is dependent on the elastic modulus of the metal tested so that a separate conversion table is required for metals differing materially in elastic modulus from that of steel. Origin of this effect was shown to be in the elastic spring-back with load release under the Rockwell test.

Equation Is Developed

A simple empirical equation expresses accurately the relation between Rockwell C and diamond test values on steels, Messrs. Scott and Gray demonstrated. With change of a single constant the same equation gives equally well the same relation of sintered carbides. Adding a term to this equation for elastic modulus, the new constants were evaluated from observations on steel and sintered carbides. Values then calculated for metals of low elastic modulus, copper and aluminum alloys, agreed well with a few experimental observations.

An exceptionally interesting and thorough discussion of the tempering of high-speed steel was presented by Morris Cohen, assistant professor of physical metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., in collaboration with P. K. Koh, Patent Shaft

(*Please turn to Page* 71)

SORRY—

NO GOOSE GREASE

A COAL-MINE car journal and a skip-drum bearing *both* need lubricating. And neither does well on makeshifts.

A crusher gearbox and a centrifugal pump shaft; a ship's stern tube and a bucket-conveyor tumbler—the list is a yard long and there are also variables in operating conditions and mechanical design which may change lubrication specifications a score of times in one company.

Now—while we don't supply "goose grease," we *do* have scores of different greases in the Shell line. There is a right grease for every lubricating need. It costs no more than the wrong grease and usually costs less.

After all, it is not how much a plant can save on its grease bill; it is the dollars saved on repairs, replacements and shutdowns and the dollars saved on reduced friction which really count.

The services of Shell's lubrication specialists go along with its complete line of greases. This staff, thoroughly trained in solving lubrication problems, is available without charge anywhere in America.

SHELL

SHELL
INDUSTRIAL
GREASES

WHICH UNIT HEATER IS BEST?

THIS BUYER SETTLES IT!

Gets the answer from unbiased test—

by outside testing laboratory . . .

Six unit heater manufacturers were after the order—to be placed by a large midwest factory! It was a mighty large order, too—so competition was keen. And every one of the unit heaters offered was a good one.

What to do? A COMPETITIVE TEST—that's the solution the factory decided on. So each heater manufacturer was instructed to send his unit to the prospect's factory for testing. Six different tests were conducted on each heater—as listed in the box to the right. And the Sturtevant Speed Heater came out on top!

So far, so good. But was the test unbiased? This midwest factory decided to lean over backwards to be fair. They sent three of the competing unit heaters to an independent testing laboratory for unbiased tests on the same six points!

Result: Sturtevant Speed Heaters won again! And a total of 68 were ordered.

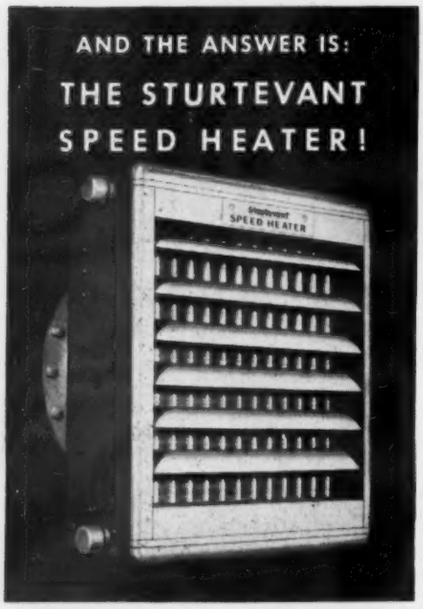
If you are now considering the purchase of heating equipment, we invite you to investigate the Sturtevant Speed Heater and its exceptional combination of advantages. Our nearest office will welcome your inquiry.

EACH UNIT HEATER TESTED FOR:

1. Quietness of operation.
2. Volume of air handled.
3. Horse power required.
4. Air distribution over face of unit.
5. Actual heat output.
6. General appearance.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.
Branch Offices in 40 Other Cities B. F. Sturtevant Co. of Canada, Ltd.—Galt, Toronto, Montreal

AND THE ANSWER IS:
THE STURTEVANT SPEED HEATER!



A few of the 68 Sturtevant Speed Heaters installed in the plant of this large midwest factory.

Write for Catalog 396-7

It contains complete information regarding Sturtevant Speed Heaters . . . and their many advantages including—high efficiency, low final temperatures (which assure comfort for people near heaters), guaranteed capacities, double pipe connections that save time, labor, and pipe, time saving hangers, etc.

Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

SPEED HEATERS ARE DISTRIBUTED BY CRANE CO.

New Tube Mill

Large looper table permits continuous operation of new tube mill at speeds from 87 to 400 feet per minute. Furnace designed to increase heating efficiency and accuracy of control, thus improving quality of pipe produced

■ CAPABLE of making 0.5-inch to extra heavy 3-inch butt-welded pipe in lengths from 1 to 45 feet by the Fretz-Moon process, a new continuous tube mill has just been completed and put into operation by Republic Steel Corp. in Youngstown, O.

The first of its kind to be installed in the district, it is to be followed immediately with a second similar unit, the company has announced.

These two mills will use a continuous butt-weld process in which the skelp is formed in a forming mill rather than being drawn through a bell die, as is the usual practice for making butt-welded tubing. Because of improvements in design of furnaces, giving increased efficiency and accuracy of control, tubes made by this new process are of better quality. Size is more closely controlled. Quality of weld is improved and inside cleanliness of pipe is augmented greatly.

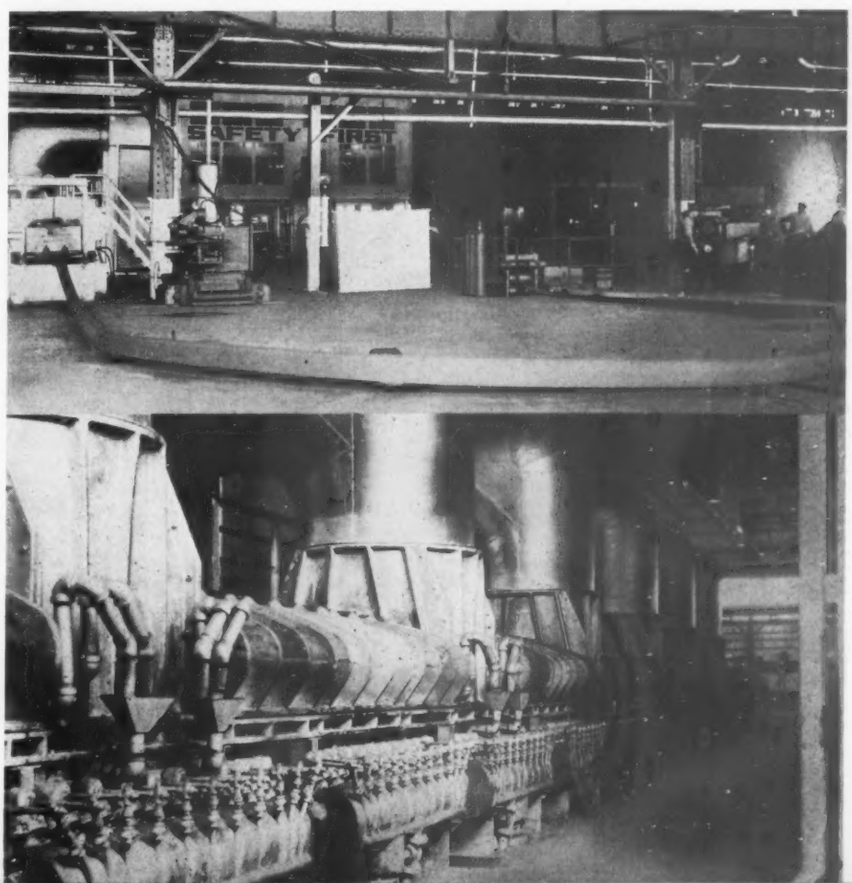
In the manufacturing of tubes by this process, the skelp is brought to the mill in coils varying in length from 300 to 1200 feet. As the skelp is uncoiled, it is passed through a roller leveler, and the end of each new coil electrically welded to the railing end of the preceding coil. This makes a single continuous strip for charging into the furnace.

From this end-welder, the skelp is run out through pinch rolls to a large looping or storage table which allows the uncoiling of the skelp to be interrupted long enough for ends to be welded without interfering with, or slowing down, the portion being fed into the furnace.

As a further precaution against undue tension or buckling of the hot skelp as it passes through the furnace, it is sent through a second, carefully controlled loop just before being charged. A dancer-roll rheostat, introduced in the looped skelp at this point, maintains the size of the loop by speeding up or slowing down the motor driving a second set of loop pinch rolls at furnace entrance.

A recuperator type furnace, 150 feet long, is used. It has three heating zones which are fired with rows of burners using coke oven gas. Burners are aimed at edges of strip. The first zone, operating around 1000 degrees Fahr., is used as a preheating chamber to bring the temperature of the skelp up gradually. In the second and third zones, temperatures in the neighborhood of 2500 degrees Fahr. prepare the skelp for forming and welding. The recuperators with which the furnace is supplied are used not only for fuel economy but to obtain the rapid combustion needed.

The skelp is carried through the furnace on tubular, water-cooled skids especially designed to minimize the accumulation of scale and thus improve quality of pipe. A blast of heated air, directed at the edge of the skelp as it leaves the furnace, serves to remove any dirt remaining on the metal. By directing this blast against the two edges of the strip as the forming



Upper, in Republic's new tube mill in Youngstown, skelp is charged continuously into heating furnace from a carefully controlled floor loop. A dancer-roll rheostat maintains size of loop by controlling pinch rolls in left background. End welder and roller leveler at extreme right. Lower, recuperator type furnace, approximately 150 feet long, is direct fired with coke-oven gas. Burners, spaced 9 inches apart, heat skelp to successively higher temperatures in three zones

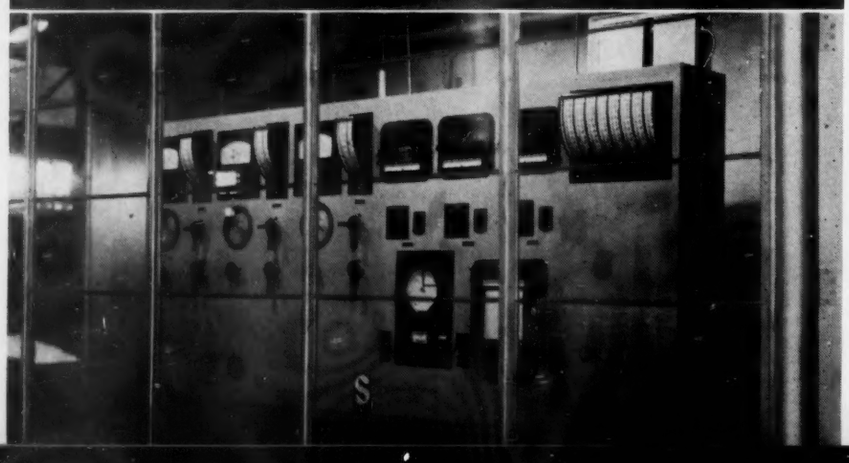
rolls bring them together, oxygen is added under pressure. This serves to whip up the temperature of the edges of the skelp several hundred degrees and improves quality of weld.

Forming and welding of the tube immediately follows exit of skelp from the furnace. Three sets of grooved rolls, each set consisting of one pair of vertical and one pair of horizontal rolls, handle these operations. See accompanying illustrations. The first set is the forming rolls. The second and third sets guide the welding process which is promoted entirely by the heat in the skelp itself. Each set of welding rolls forges the weld by reducing slightly the diameter of the pipe as it passes through them.

The skelp leaves the rolls at anywhere from 87 to 400 feet per minute, depending on the diameter of pipe being produced. A traveling hot saw, actuated by flag switches, cuts the tube to required lengths with an accuracy of plus or minus 0.25-inch.

After being cut to length, the tubes are carried away from the saw by a conveyor which carries the pipe to mechanical descaler. This unit cracks off scale by deforming the pipe to an oval cross section. In certain subsequent straightening and sizing operations, all scale is removed. A third conveyor, on the exit side of the descaler, carries the tubes to a second cooling rack from which they are removed and sent through the usual finishing processes.

Top, flat heated strip coming from furnace is formed and seam is forge welded by these rolls. Center, tubes coming from rolls at extreme right are cut to length by a traveling hot saw and carried by conveyor to transfer cooling rack shown in left foreground. Bottom, control board is provided with every instrument for close control of furnace



♦

Acid Disposal Is A Big Problem

■ APPROXIMATELY $9,000,000 annually is expended to take care of industrial waste in this country including spent pickling liquors, according to a government estimate. This information was contributed by Dr. W. W. Hodge, American Iron and Steel institute research fellow, Mellon Institute of Industrial Research. Pittsburgh, in the symposium on the disposal of waste acid, conducted by the Wire association during its annual meeting in Chicago, Oct. 23-26.

Many operators of pickling plants object to the reuse of recovered acid and in view of this policy the speaker made a plea for more data as to why this is true. Municipal authorities in a number of cities use spent pickle liquor in the sewage disposal process. Authorities in Tampa, Fla., have found a use for it in treating the water supply. The city gathers tin cans and scrap iron from its dumps, treats this material with the acid, then adds the solution to the water supply. This practice, the speaker said, is saving the city many thousands of dollars annually.

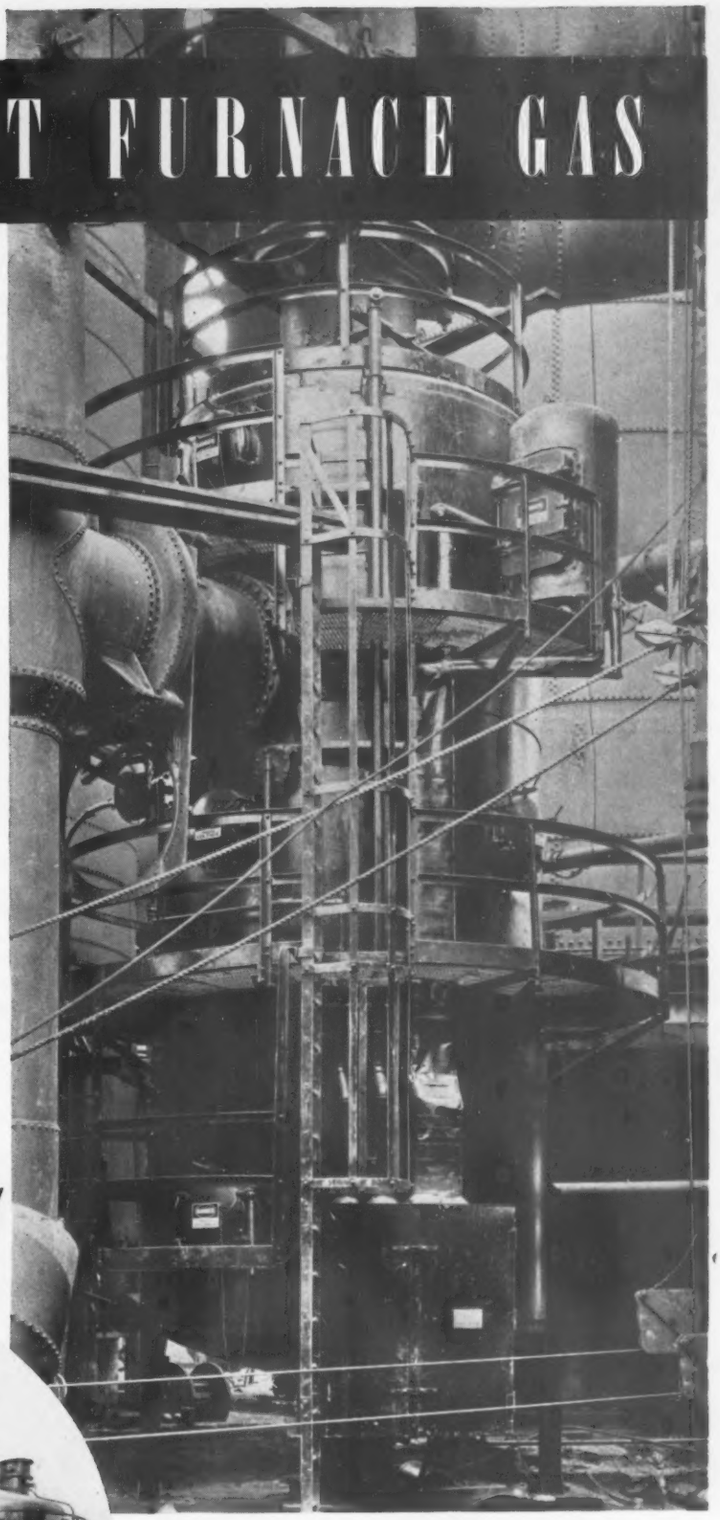
In this country alone, Mr. Hodge explained, it is estimated that waste pickle amounts to 500,000,000-800,000,000 gallons per year. In his opinion, the use of waste acid by public authorities varies in different cities. Some cities prefer liquor and others copperas.

No processes for the recovery of hydrochloric acid have been patented, according to the knowledge of the speaker. He pointed out that spent hydrochloric acid gives pigments of bright colors and, hence, is in somewhat of a demand from paint manufacturers. The use of inhibitors, he cautioned, produces dark colors in the pigments.

Free acid coming from wire mill pickling vats is around 1 to 2 per cent as well as being high in ferrous sulphate. The liquor from the continuous vats in modern sheet and

(*Please turn to Page* 79)

CLEAN BLAST FURNACE GAS



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• In the Cottrell Process, the actual power consumption is less than with any other type of collector. It ranges between 0.5 and 1 k.w. per 100,000 feet of gas cleaned. Full automatic operation minimizes labor costs.

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• For comparable capacity and efficiency, a Cottrell installation has lower overall cost than any other type or combination of types and will out-perform and out-live any other equipment in the field of dust collection.

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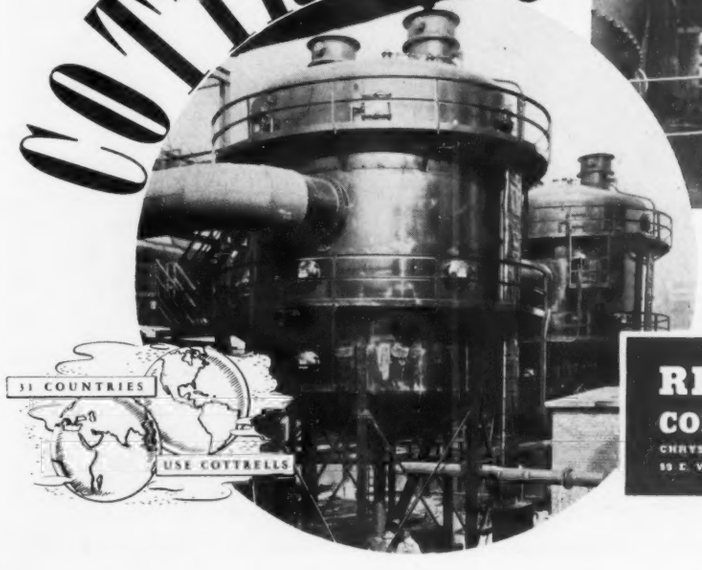

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Track Roller Frames

Welded assemblies produced with unusual efficiency. Jigs and fixtures aid greatly. Special machine straightens units to assure alignment. Automatic machining operations featured

By C. A. DAVIS JR.
Engineer
Caterpillar Tractor Co.
East Peoria, Ill.

■ WHILE MANY welded parts are employed in Caterpillar tractors, it is only after detailed study of designs for function and appearance, production, performance and service, sale and cost that a welded assembly is employed. Experience with hundreds of welded parts over a period of years has developed well organized procedure.

In considering a welded part, it is designed from scratch and has little similarity to parts assembled or made by other methods. A consideration of the design of a typical part, methods of control, production, inspection and assembly will show why this company regards welding, properly used as a meritorious production tool.

A track roller frame assembly is the frame on which the weight of a tractor rests and rolls. Two of these are required per tractor. Fully assembled position is shown in Fig. 2. Frames for Model D2 Caterpillar diesel tractor must transfer the weight of the tractor to the rollers, support the rollers as well as maintain their alignment, support the front idler and maintain its alignment, provide for oscillation of the track, absorb shock, have provision for maintaining tension in track, resist side thrust in turning and in working on side slopes, permit ready accessibility and replacement if necessary, provide support for attachment of miscellaneous special equipment such as bull dozers, side boom lifts, snow plows, etc.

Appearance requires that lines should conform to those of the complete tractor, that there should be no obtrusive projections and that good workmanship should be evident. Production requirements necessitate minimum number of parts entering into the assembly, and that the parts used in ultimate assembly of the tractor on assembly line be readily handled with safety and ease. Welded construction has important advantage in extreme rigidity it offers. Otherwise misalignment of rollers and idler would result in poor performance of tractor on irregular rocky footing, giving rise to serious wear of track and rotating parts. Thus, in this application, other constructions have been superseded by welded units.

Figs. 1 and 5 show details of construction employed. The bearing which transfers weight of tractor to the frame at the rear is made from standard tubing upset at each end to form the flanges shown. After

From paper receiving $1729.84 award in $200,000 program sponsored by James F. Lincoln Arc Welding Foundation, Cleveland.

Fig. 1—Closeup view of bearing and oil seal. Here some of the rollers may be seen in place also

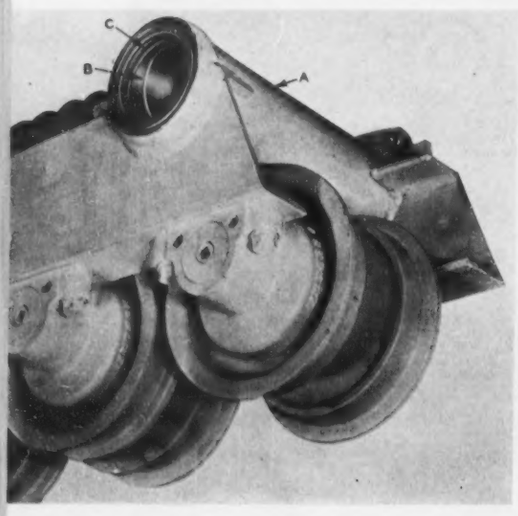
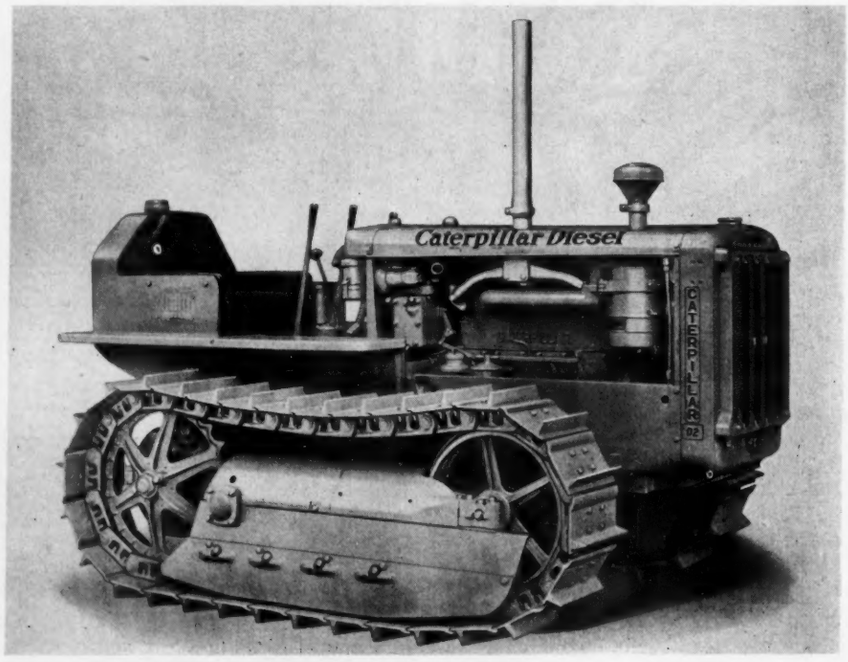


Fig. 2—Caterpillar diesel tractor, Model D2, where track roller frame is used



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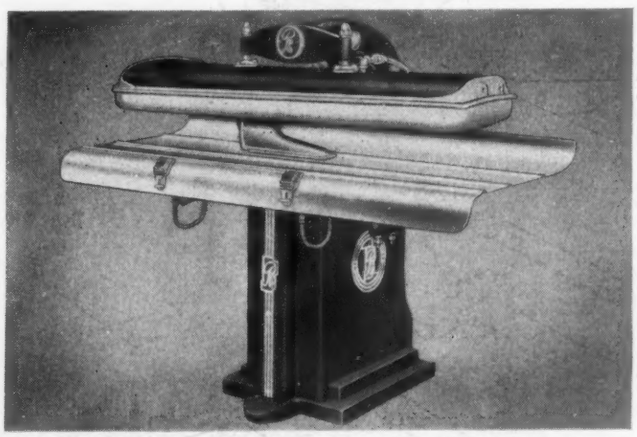
USER BENEFIT OF WELDED STEEL—Savings in floor space. Welded frame 8 inches smaller, 300 lbs. lighter.

OLD DESIGN—Bulky 7-piece frame bolted together. Wasted space and power by scattered arrangement and poor rigidity.

● Here are two of many machinery-user benefits credited to welded design by The Prosperity Co., manufacturers of garment-pressing machinery, Syracuse, N. Y.



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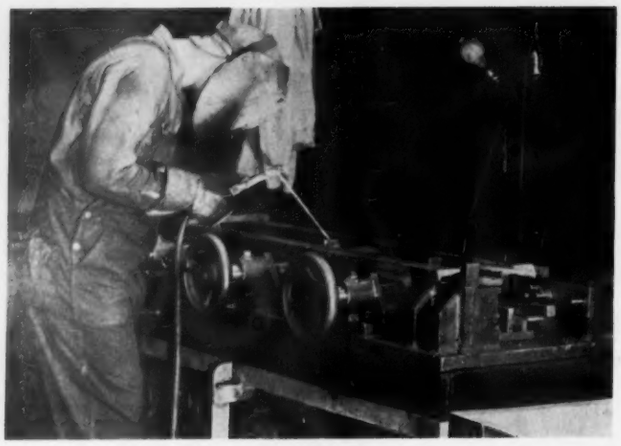

Fig. 3—First tacking operation

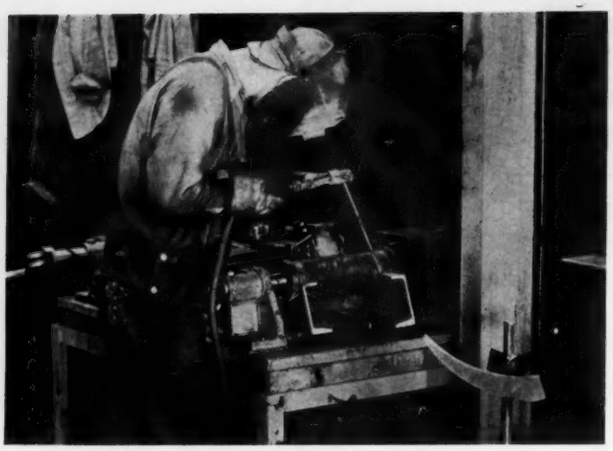

Fig. 4—Second tacking operation

assembly it is bored, bushed at each end and line reamed to receive the pivot shaft. Oscillation occurs about this shaft as a center when machine passes over obstacles in its path.

Welding of this frame is a high-production job as a flow of these units feeds the power conveyor tractor assembly line, Fig. 8. Both right and left hand frames are produced alternately by the same operators on the same machines, an interesting feature. Entire production described here, with exception of the operations performed on the material before it arrives at the tacking booth, takes place in a straight line about 200 feet long. All machines including the surface broach and four separate welding booths are in this line with plenty of room around each unit and in each welding booth. Conveyors are located at proper height to permit rolling the work into fixtures without lifting. Special tool equipment has been provided in many places. Fixtures are used throughout to facilitate welding. These assure an attractive ratio of arc to total time.

Parts Preformed

Outside the tacker's booth is a store of special channels which have been punched and cut to shape as shown in Fig. 5. Bearing D, Fig. 5, has been relieved of the fillet under the upset ends by turning. The plate at J has been milled at edges, and T-section also has been machined to 45 degrees along the top face. All other parts entering the booth are punched and formed cold from plate.

Inside tacker's booth one fixture enables one man quickly to set both channels, tee, braces, plate A and plate J in assembled position. Fig. 3 shows this fixture with above parts, except plate J, in place. After being clamped rigidly in position determined by gaging surfaces on the fixture, parts are tackwelded. Then frame is carried on a convenient hoist to position shown in Fig. 4 in the same booth where plate J is positioned and tacked in place. This operator with aid of the two fixtures easily supplies frames to the two welders occupying separate booths adjacent to his.

In either of the next two booths, a universal fixture permits the frame to be rotated through 360 degrees and has stops which permit its ready adjustment to predetermined positions, thus facilitating finish welding in best possible position.

From welding booths, frames are placed on conveyor, slag and spatter cleaned off and the frame accurately aligned in the press, Fig. 7. Experience has indicated that when such alignment can be done safely, it is more advantageous and gives more uniform final alignment in all parts than attempts to control any slight distortion which may occur during the welding. Although procedure is employed to give minimum distortion from welding, it appears the most careful practice permits some possibility of distortion which may prevent proper interchangeability.

After being straightened, the channels are surface broached on the bottom and along the inside of the bottom flanges. A locating hole serves to locate the frame for all subsequent machining. This hole is drilled and reamed following broaching operation on channels, after

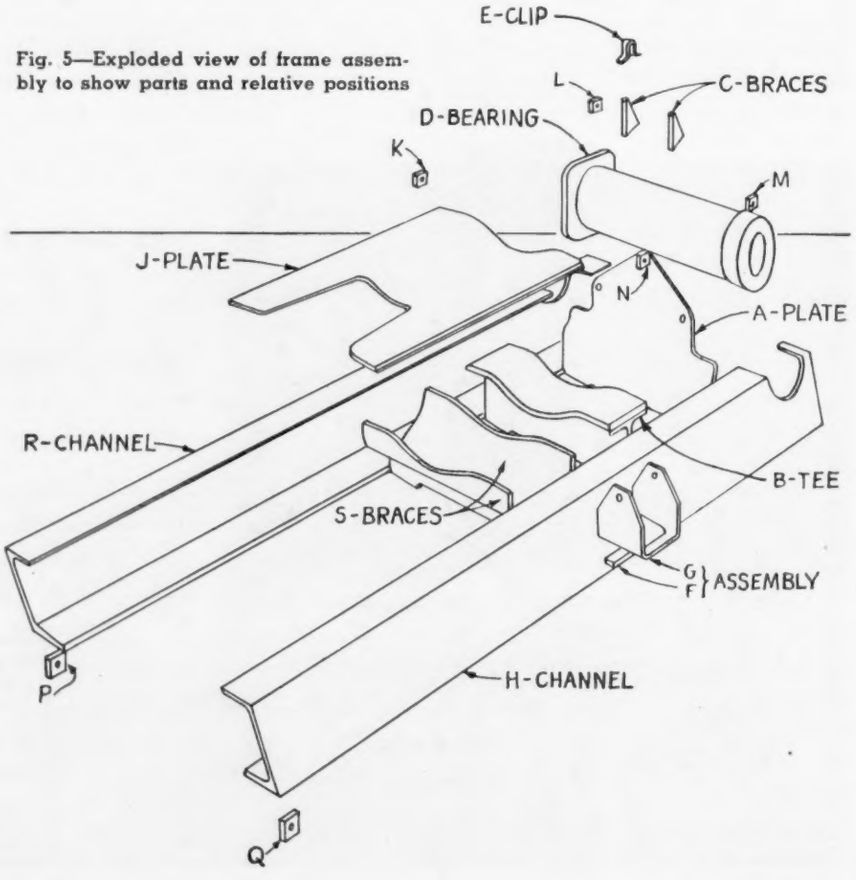

Fig. 5—Exploded view of frame assembly to show parts and relative positions

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Fig. 6—Welding the frame. Note rotating jig for positioning work

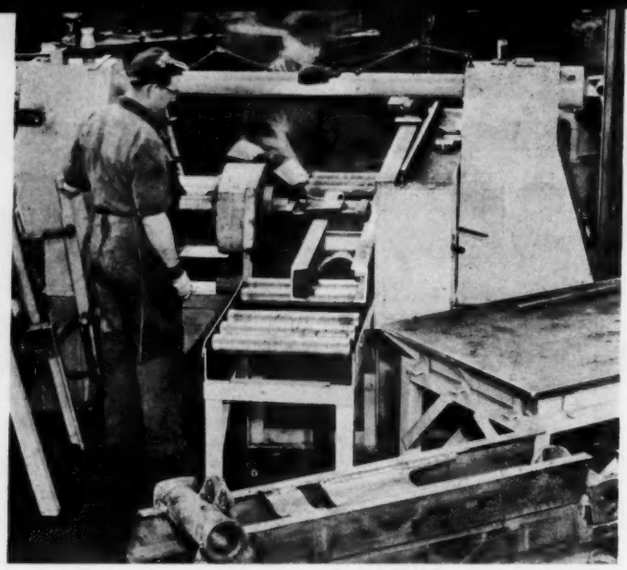


Fig. 7—Special straightening machine assures interchangeable units

which the frame moves to the special machine shown in Fig. 9 which bores, counterbores, faces and chamfers the bearing. After completion of these operations, frame is indexed to the right in the machine and bronze bushings are dropped from two feeding mechanisms and pressed into the bearing housing. Indexed again, the frame locates in the correct position for line reaming the bushings, which is accomplished by motor-driven unit at the extreme right in Fig. 9. As each frame enters the machine, another is discharged onto a conveyor for the next operation.

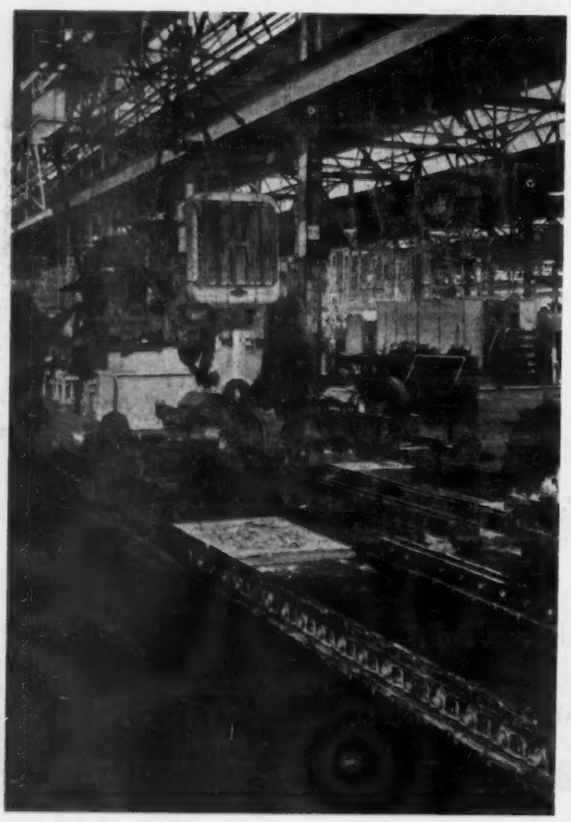
Drilling and tapping of the several required holes are accomplished on two special machines equipped with roll-over devices and conveyors which facilitate locating the work. A multiple-spindle drill is automatic and requires no attention from the operator after the frame has been clamped in place. A radial drill taps the holes.

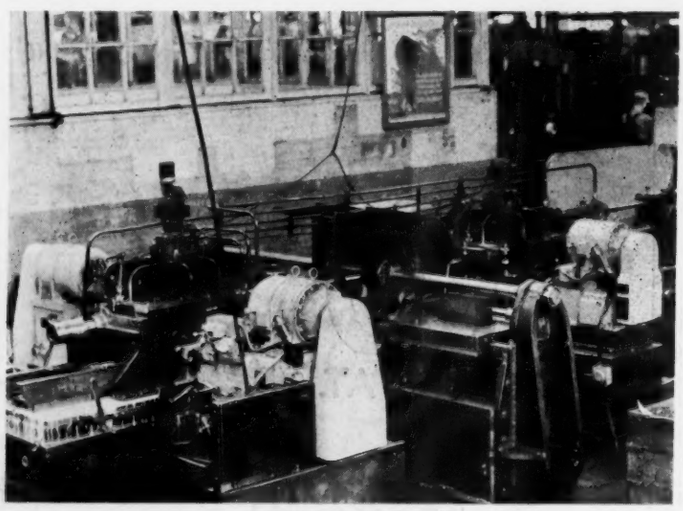
From tapping station, frame rolls along a conveyor to the welding booth where six threaded lugs as well as clip E and the assembly GH, Fig. 5, are welded in place. Locating surfaces register the frame in position and hinged elements on fixture locate all of the parts remaining to be welded into either left of right hand assemblies. Discharged from the booth on the conveyor seen in rear of Fig. 10, the frame is cleaned up and prepared for inspection—a finished track roller frame assembly.

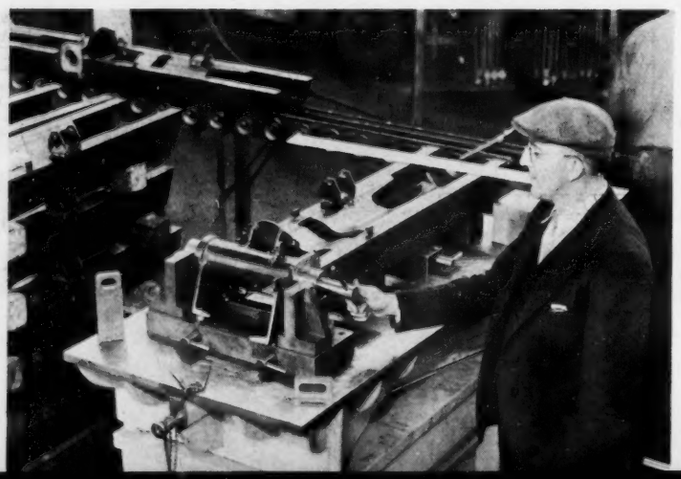
Inspection is most important to maintain the high standards of quality. Finished units are individually checked in a special fixture shown in Fig. 10 which positions the finished frame from locating hole and ground blocks. Plug gages actuated by

Fig. 8—Power conveyor assembly line where tractor power unit is placed on roller frame assembly. This is followed by moving tractor away under its own power

Fig. 9 (Upper)—Special machine bores, faces and chamfers bearing, assembles bushing and reams bushing. Fig. 10 (Lower)—Inspection fixture and gages checks all dimensions rapidly. Note conveyor in background







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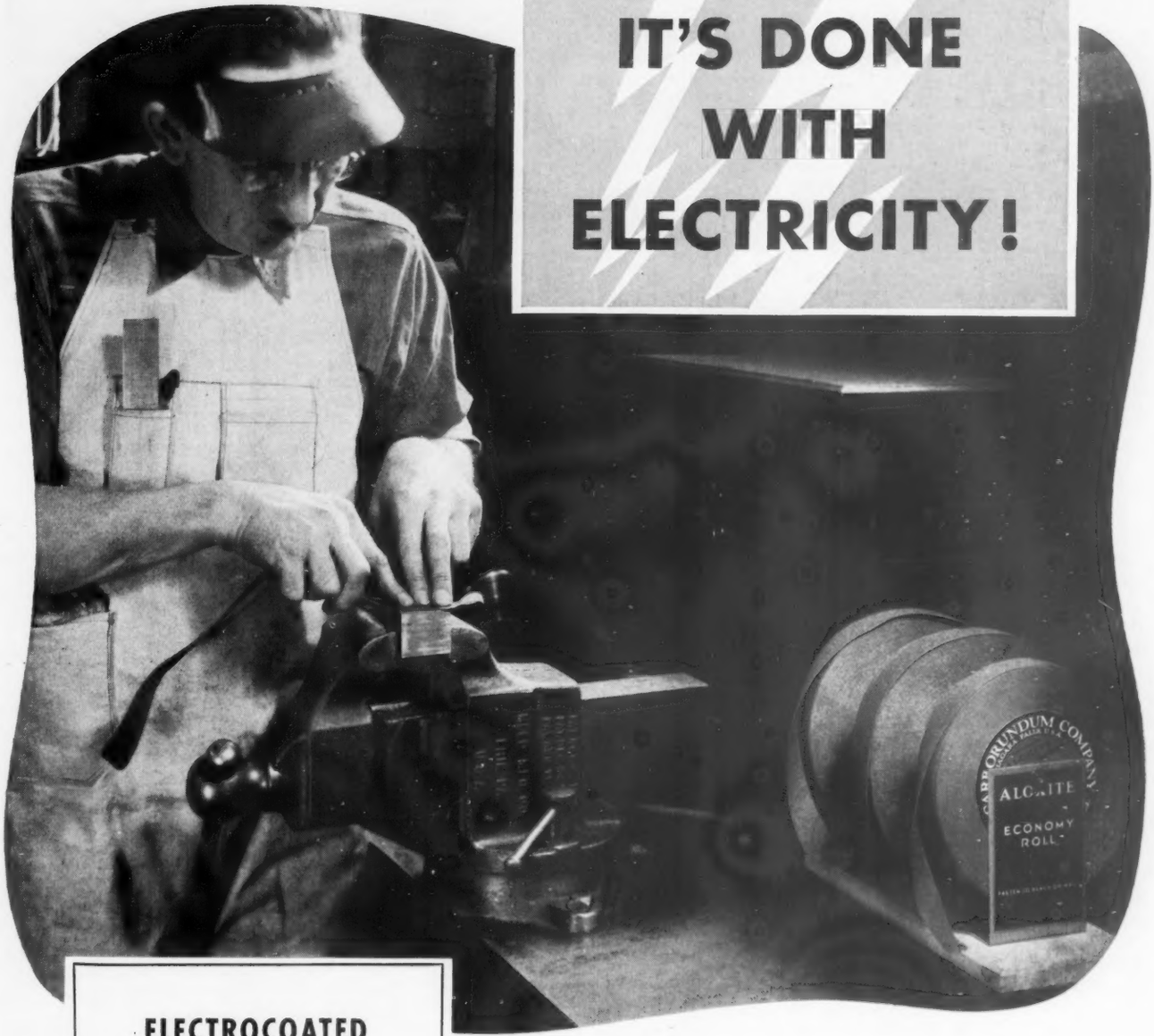

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three handles visible in Fig. 10 check the location of holes drilled in lower flanges. Another plug gage checks alignment of bushing bore by reference to four gaging surfaces affixed to the table and also affords a partial check on bore diameter.

Flat gages resting on the table are used to check any ovality in the bore that the cylindrical gage may have passed. Sheet metal templets check relation of various parts where tolerances may be plus or minus 0.010-inch. A straight edge resting on top of frame detects any severe variation from straightness.

In addition, the threaded holes are given the usual plug gage check for pitch diameter and lead. Bearing counterbore is checked for size and ovality. Also, of course, the inspector carefully scrutinizes all welds before passing the assembly.

From inspection booth, frame unit moves along a continuous conveyor where all the additional parts except the equalizer spring and pivot shaft are taken on. Rollers on which the weight of frame rests and their guards are bolted on the bottom flanges of the channels. Recoil spring with its adjustment, front idlers, yoke and guides are assembled to the frame on this line. Then the right and left frames are paired, pivot shaft is placed through the seals and bearings in the frame, fastened in place and lubricated. After the equalizer spring assembly is placed in position, the joined frames await addition of their motive power.

Fig. 8 shows the tractor assembly being hoisted off the end of the conveyor and being lowered onto the track roller frames as they stand over a pit constructed to facilitate assembly of tractor and track roller frame. At right center in this view can be seen the track roller frames for the next machine to be finished on the conveyor line. In a few moments the tractor in Fig. 8 will have been affixed to the frames, started and driven under its own power onto the extended track in the foreground. Closing the open link in the track releases the completed machine to inspection and test department.

Due to use of welded assemblies, the crane operator and assemblymen know the parts will go together with precision and that the new tractor will roll away in an excellent manner. So does welded construction assure the perfect alignment so important here.

Welding Society Papers Cover More Subjects Than Ever Before

■ ABSTRACTS of papers presented at the 20th annual meeting of the American Welding Society held in Chicago, Oct. 22-29, 1939, covering sessions up to Wednesday afternoon were presented starting on page 61 of last week's issue of STEEL. Other papers are reviewed here.

In welding of boiler drums and pressure vessels, R. T. Kernoll, Edge Moor Iron Works Inc., Edge Moor, Del., said his company has been making increased use of etching on the edges of plates to good advantage. All work put on automatic welding machines has the plate edges etched as a precautionary measure. Etching sometimes reveals bad plate conditions which usually show up as a banded structure up to 1½ inches in length, generally running parallel with the plate edge.

Mr. Kernoll commented on a growing tendency with the larger companies to write specifications of their own for welding of boiler drums and pressure vessels. Naturally such specifications include all local state and insurance regulations which apply to their location. However, they go further in that they establish specifications covering their own particular requirements.

The success of many welded red brass piping installations is attributed to the high copper content of the material and to the improvements in welded joints, according to A. N. Kugler, Air Reduction Sales Co., New York, who detailed recommended fluxes, flux application, welding technique, joint preparation and other factors entering into such work. He mentioned greatly improved strength and ductility of weld metal with increased weld density and hardness as important developments. Modern methods permit such welding to be done at speeds approximately 25 per cent higher than previously with subsequent lowered costs. Simplification of the technique involved now assures that average operators can handle the process satisfactorily.

New Liquid Flux

With a new liquid flux and with higher strength bronze rods, brazed welds of tensile strengths as high as 71,000 pounds per square inch have been obtained. Ductilities permit satisfactory face and root bends in the guided-bend test on steel and galvanized iron. Welding of galvanized pipe by this procedure is of interest as coating the galvanized surface with the new liquid flux a distance of 3 to 4 inches on each side of the weld preserves the coating intact.

A simplified method for ascertaining the necessity of nozzle reinforcing and also the amount and type of reinforcing required to comply with boiler codes was presented by F. C. Fantz and W. G. Hooper, both of Midwest Piping & Supply Co. Inc., 1450 South Second street, St. Louis. A number of charts and tables aid in the calculations suggested.

The experience of Taylor Forge & Pipe Works, Fourteenth street and Forty-eighth avenue, Chicago, in making welded pipe and pipe fittings some of which had to be upset during forging of flanges was detailed by E. Hall Taylor. Welded penstock piping for a power installation was upset by forging during fabrication with excellent results. A series of tests showed the weld metal to be equal to or better than the parent metal when both were subjected to identical forging operations.

Pipe Fittings Combined

An interesting extension of fusion welding is the growing practice of combining several standard pipe fittings by welding to form a special pipe fitting. This permits special assemblies to be made easily to fit the most difficult piping layouts. A step toward a more perfect piping system is the present availability of standard fittings and piping assembled by welding which permit the fabricator to deliver a complete piping unit that requires making only end connections to complete the installation.

In high-speed resistance welding work, use of synchronous timing eliminates troubles from current surges according to E. W. Forkner, Federal Machine & Welder Co., Warren, O. In a recent type of extremely high-speed welder a flat commutator switch is employed to connect the secondary winding of the transformer to the individual circuits feeding the individual welding points. This commutator consists of individual segmented blocks connected to the individual points and placed in a row parallel to a flat conductor bar connected to the transformer. Over this assembly a roller connector passes to connect the individual welding points to the transformer in rapid succession. This permits all points of the welding machine to be brought down at once. The lack of impact during operation is valuable. With such equipment, 800 to 1000 spot welds per minute now are obtainable.

Another important development is

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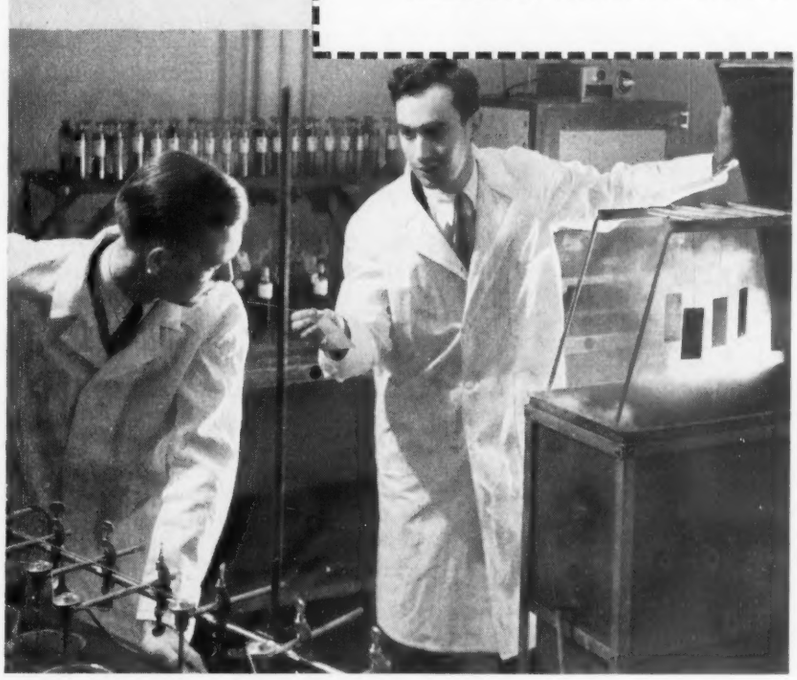
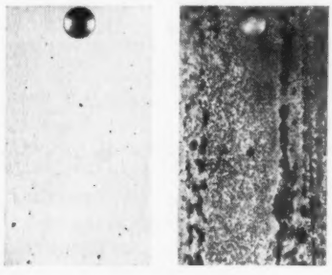


Exhaustive accelerated corrosion tests have been conducted in the Gulf laboratory to determine the effectiveness of GULF OILCOAT NO. 1 as compared with ordinary slushing compounds. The metal samples below tell the story.



Here's Proof!

These two similar pieces of metal, one slushed with GULF OILCOAT NO. 1 and the other with a conventional slushing compound, were exposed to highly corrosive influences for the same length of time. The superior value of GULF OILCOAT NO. 1 is clearly demonstrated by the perfect condition of the metal plate on the left.

GULF OILCOAT NO. 1

is easily applied and long lasting—Protects highly finished metal surfaces.

YOU can now secure an improved material to protect highly finished surfaces of steel and non-ferrous metal products against corrosion—GULF OILCOAT NO. 1. This product is an entirely new type of slushing compound, developed by Gulf technologists after many years of research and field tests.

WHILE GULF OILCOAT NO. 1 provides a thin film which is not easily rubbed off by handling, it may be readily removed by conventional solvents. Accelerated laboratory corrosion tests, as well as field tests with all types of metals, have established the superiority of this new type of slushing material over products formerly used for this purpose.

GULF OILCOAT NO. 1 can be applied by any conventional method and lasts for a long period of time. It is nominally priced and economical to use.

Ask the Gulf representative who calls on you to give you further details—or fill in and mail the coupon above for complete information.

GULF INDUSTRIAL LUBRICATION

the continuous rotary-type machine on the order of a multiple-turret machine. This unit has multiple, portable heads around the edge. Speed of such a machine is not dependent upon welding operation but depends only upon the speed with which the different fixtures can be loaded and unloaded as welding is done while the fixtures revolve. Thus, there is no delay and the welding is continuous. Such a setup permits extremely fast operation.

Conveyor-type continuous machines employ a similar arrangement with multiple fixtures, head functions being controlled by master cams to give up to 1500 spot welds per minute. Here, secondary current is conducted through laminated brushes to the welding points.

Describing in detail the organization of the welding department in a steel mill, R. P. Palmer, Wheeling Steel Corp., Wheeling, W. Va., pointed out that suitable location and equipment were necessary essentials. He emphasized that weld designing, selection and training of welders, systematic organization and cost recording, study of savings secured by welding and the need for welding deparment to sell welding to all departments of the mill were essential factors.

To aid in maintaining quality of work, each welder stamps the job with his check number at start and stop of his weld and understands distinctly that he is responsible for the work he does. Each welder is required to make test welds every 60 days.

In speaking on ship welding, E. D. Debes, Bethlehem Steel Co., Quincy, Mass., detailed a number of interesting applications. Some difficulty was encountered at first in making rudders, but it was eliminated by radically redesigning the rudder and by laying out a method of control of welding procedure specially suited for this structure.

Subassembly Welding Increased

There is a great demand in this plant for more welding space and heavier crane equipment to increase subassembly welding and give lower overall costs. Production control involves close co-operation with the drafting room, setting up of general procedures and detail sequence schedules. These sequences cover every step in ship and shop welding and are developed by close co-operation of the welding engineer, foremen, superintendents and general production department. In welding ships, adequate ventilation is assured by use of large ventilating sets with branches to the compartments and with small units which may be brought to the job. When working with weldments which require preheating, cooling rooms are provided and lemon and salt tablets given to the men. The company maintains a welding school in which some 300 unskilled men already have learned welding and are now working in the plant which employs 650 welding operators.

One special job was the welding of the deck of a large vessel consisting of a heavy framework covered with 4-pound (3/32-inch) galvanized plating. To avoid buckling of the plating, mechanically straightened plates were ordered and the welding procedure carefully worked out by extensive experiments. No straightening was necessary on this deck. The main features of the welding were to tack weld all plates in place with light flat bar stiffeners welded on the underside. Seams and butts then were welded plate by plate using a wandering sequence. This procedure had the effect of drum-heading the plate. An improved type of electrode holder requiring the men to turn in their stubs for new wires has increased the deposit rate from 52 to 65 per cent and has permitted a saving of $7500 worth of electrodes per year.

Beams in Welded Buildings

A procedure for the direct design of beams in welded building frames to take partial advantage of the reduction in maximum moment afforded by moment-resisting semi-rigid connections was presented by Bruce Johnston and E. H. Mount, Lehigh university, Bethlehem, Pa. The average saving in weight of beams is 15 per cent or more and type of construction is applicable for floor loads specified for apartment house and office building construction with a maximum beam length of about 20 feet.

In discussing design and fabrication of welded structures, C. E. Loos, Carnegie-Illinois Steel Corp., Carnegie building, Pittsburgh, and F. H. Dill, American Bridge Co., Frick building, Pittsburgh, emphasized that welding is a method of connection. Its use, therefore, requires careful analysis of joint detail to determine its effect on the members themselves. Connections which have any weld above the bottom of the beam must have welds strong enough to carry the full restraining moment offered by the supporting structure. This fact was explained and its application detailed. The acceptance of welding for bridge construction has been rather slow, and only a few welded truss bridges have been built. Welding has been widely adopted for fabricating plate girders and rolled beam spans and also for repairing existing bridges. Even on all-welded structures, miscellaneous parts and details require a large proportion of the total welding used and so their design has a major effect on the economy of the structure.

Practice employed in fabricating welded concrete tunnel forms, trusses, light towers, car frames and other structures was detailed by Alexander L. Wilson, Mississippi Valley Structural Steel Co., Melrose Park, Ill. An interesting jig was described for welding car frames. Highway expansion joint construction also was described.

In railroad work, one of the largest fields for welding has been in rebuilding battered ends of rails, according to C. E. Morgan of Chicago, Milwaukee, St. Paul & Pacific Railroad Co., Chicago. Now this work has been extended to maintenance of frogs and crossings, butt welding of rails for long length, welding of bridges, repairing existing structures and for repair of equipment used continuously on right of way such as motor cars, drag lines, shovels, ditchers, ballast machinery and bolt machines.

The use of multiple spot welders especially designed for the production of passenger and freight cars was covered by John W. Sheffer, American Car & Foundry Co., 30 Church street, New York, in presenting methods employed by his company. These units employ selector switches which permit the operator to preset various operations to secure automatically the execution of a dozen or more single operations. Magnetic control through a special sequence panel is the brain making possible the several functions in the execution of the large number of welds in a panel. Pushbuttons, selector switches, transfer switches, limit switches, contactors and solenoids are interconnected with the setup to permit full automatic control and also to permit taking over manual control of any step in the operation and at any point in the operation.

Elevated Temperature Service

A description of how welding and hard surfacing were used in the production of valves for high pressures and elevated temperatures was presented by W. F. Crawford and L. H. Carr, Edward Valve & Mfg. Co., East Chicago, Ind. Practically all phases of the subject were discussed including types of steel for high-temperature high-pressure service, uses of welding for various valve parts, tests of valve materials and welded assemblies and the problems connected with hard surfacing such work.

Shrinking of steel to correct distortion from welding and forging was discussed by Samuel T. Smetters, the sanitary district of Chicago. It was noted in welding that the shrinkage is lessened if the weld is protected, allowing the heat to

dissipate throughout the entire mass. Quite often the effect that heat produces does not seem reasonable, but when one considers that locked up stresses are being relieved, it is easy to understand. Sometimes it is well to correct minor distortions immediately by heating and shrinking to counteract the effect of welding.

A beam or plate may be rolled when one portion of section is hotter than another or of slightly different composition, with the result that when it is cold it will have locked up stresses. Beams straightened cold are quite sure to have certain locked up stresses. It is well to remember any steel section having locked up stresses will react to relieve them when heated. Details were presented showing methods involved in shrinking steel to correct distortion of headgate for the Lockport power house, machine girders, and other structural parts. It was pointed out that laboratory experiments and observations are required to determine how much can be used, the effect of time asd repetitions on the work and the amount of contraction possible.

♦

Tool Steels Are Bright Hardened

(*Continued from Page* 56)

& Axletree Co., Wednesbury, England.

The mechanism of tempering and secondary hardening in 18-4-1 high speed steel was investigated by means of X-ray, hardness, specific volume, electrical resistance, metallographic, dilatometric and magnetic measurements on hardened specimens tempered at several temperatures for times ranging from about 1 minute to several hundred hours. At some temperatures, single tempering was directly compared with multiple tempering.

Based on their tests, the authors concluded that:

1. Hardened 18-4-1 high speed steel contains highly alloyed tetragonal martensite, highly alloyed retained austenite, and undissolved complex carbides.

2. General tempering mechanism of hardened high speed steel involves four overlapping stages:

I. Decomposition of the tetragonal martensite with the precipitation and coalescence of cementites in a highly alloyed ferrite matrix.

II. Precipitation of complex carbides from the residual austenite.

III. Transformation of the residual austenite.

IV. Precipitation of complex carbides from the ferrite matrix of stage I, and re-solution of the cementite.

3. Initial softening of hardened high speed steel is due to stage I. Secondary hardening results from a combination of stages II and III. Stage IV is not encountered in normal commercial tempering.

4. In normal heat treatment, little, if any, of the residual austenite transforms at the tempering temperature. Instead it transforms during cooling into martensite which is probably based on complex carbides rather than on cementite and hence is more resistant to softening than the original martensite.

5. Amount of austenite which thus transforms and temperature at which this transformation begins during cooling depend principally upon the time and temperature of tempering, assuming constant hardening conditions, and seem to be independent of the cooling rate unless the latter is rapid enough to introduce quenching stresses. Furthermore, the cumulative amount of austenite transformed after a given time of tempering is independent of

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the number of intermittent coolings to room temperature.

6. Residual austenite may transform isothermally if the cooling from the tempering temperature is stopped within the proper temperature range. The product of this isothermal transformation is softer than the martensite formed during continuous cooling of austenite.

7. The transformation of the residual austenite into martensite during cooling after tempering causes an appreciable expansion at fairly low temperatures, and hence results in internal stresses. Using longer times of (single) tempering does not remove these stresses because the austenite still transforms during the cooling. On the other hand, if multiple tempering is used, the austenite transforms into martensite in increments during successive coolings so that the stresses are relieved and the martensite is toughened by the subsequent heatings. For the same reason, multiple tempering results in slightly lower secondary hardness than the single tempering.

Humidity Increases Scaling

C. A. Siebert, assistant professor of metallurgical engineering, University of Michigan, Ann Arbor, Mich., and H. G. Donnelly, instructor in chemical engineering, Wayne university, Detroit, presented a paper dealing with the effect of water vapor in air on the oxidation of a low carbon steel in the temperature range 1825 to 2150 degrees Fahr. It was determined that steels oxidize to a greater extent in humidified air than in dry air. The ferrous iron content of the scale formed at any given temperature in this range is higher when humidified air is used than when dry air is used, which results in a faster rate of diffusion and therefore a greater scaling loss.

Experimental work was carried out in tubular, resistance-wound electric furnace, the tube being approximately 2 inches in diameter and 30 inches long. A closed end thermocouple protection tube and an air inlet tube were sealed into one end of the furnace, the thermocouple protection tube being so placed that the hot junction of the thermocouple was directly over the sample during a run. The closed end of the furnace tube was packed with broken porcelain for several inches to aid in raising the temperature of the air to the furnace temperature. Tests were run under two conditions at each temperature, namely: 1. Using dried and purified air for the oxidizing medium; 2. Using purified and humidified air for the medium.

M. J. Day and J. B. Austin, research laboratory, United States Steel Corp., Kearny, N. J., described a simple and rapid method for heat etching which has proved useful in revealing austenite grain size for a wide variety of steels over a wide range of heat treating conditions. The method depends upon preferential transfer of material away from grain boundaries, presumably by vaporization, when the metal is exposed to a high temperature in an inert atmosphere. The method was successfully applied to a number of materials ranging from highly purifid iron extremely low in carbon to high alloy steels.

Detailed study of the nickel-tungsten system was outlined in a report by Finley H. Ellinger and Wesley P. Sykes, General Electric Co., Cleveland. This binary system was studied by the methods of metallography and X-ray diffraction, supplemented by measurements of electrical resistivity and hardness.

Although many recent discussions on nomenclature of the aggregates of ferrite and carbide have stressed the formation of lamellar pearlite as the primary product of the transformation of austenite at high temperatures, P. Payson, in charge of the research laboratory, and W. L. Hodapp and J. Leeder, research laboratory, Crucible Steel Co. of America, Harrison, N. J., cited research work to show that spheroidal carbides are formed directly from austenite, if the temperatures to which the austenite is heated, and at which it is subsequently allowed to transform, are controlled carefully. Steels studied were plain carbon with carbon varying from 0.33 to 1.16 per cent.

Shorter Annealing Cycles

New procedures for spheroidizing steels have been based on these observations, and practical annealing cycles requiring much shorter furnace times than those now in use have been developed. The new cycles involve heating to a temperature over the critical for the steel, cooling at a convenient rate to a temperature not far below this critical, holding for a necessary time at this temperature, then finish cooling in air. Total furnace times required, for small furnace charges, are about 6 to 20 hours, depending on grade of steel.

Thomas G. Digges, metallurgist, national bureau of standards, Washington, described tests made primarily to show the influence of variation of distribution and solution of carbon in austenite on the mode and rate of transformation of austenite in high purity iron-carbon alloys. Transformation of a nonuniform grain of austenite was shown to proceed at various rates in different regions within the grain and its initial transformation to troostite not always confined solely to its grain boundaries. These facts were illustrated by a representative case in which an individual grain of austenite transformed to cementite, ferrite lamellar pearlite, nodular troostite and martensite. Results of microhardness tests made on the decomposition products of this same grain of austenite, the influence of grain size on the transformation rate of austenite, and the occurrence of cracks in quenched specimens of the hypereutectoid alloys also were discussed.

Results of a microscopic study of the kinetics of martensite formation in plain carbon steel were reported by Alden B. Greninger, assistant professor of metallurgy, graduate school of engineering, Harvard university, Cambridge, Mass., and Alexander R. Troiano, assistant professor of metallurgy, University of Notre Dame, Notre Dame, Ind. Method of study provided a reliable direct-evidence survey of the entire process of martensite formation in eutectoid and hypereutectoid steel. From results of the study it was concluded that the "S-curve" of austenite decomposition gives an incorrect picture of the martensite process; hence, these curves are in error for all temperatures within the martensite range of iron-carbon alloys. The older concept that martensite forms from austenite only during cooling through the proper temperature range (advocated, though never proved, by several early investigators) was found to be substantially correct.

Commenting on this discussion, Morris Cohen, Massachusetts Institute of Technology, Cambridge, Mass., observed that American and European metallurgists appear to be on opposite sides of the ocean both geographically and "martensitically," since the European concept of the austenite-martensite transformation differs radically from that recognized in this country.

Campbell Lecture Reports Research

■ ISOTHERMAL or constant-temperature structural transformations in steel are proving a fertile field for investigation by metallurgists and are yielding a vast store of valuable fundamental data which should aid in the more profitable selection and application of steels for practical purposes. A milepost in this type of research was the annual Edward De Mille Campbell Memorial lecture presented before the American Society for Metals in Chicago, Oct. 25, by E. S. Davenport, research laboratory, United States Steel Corp., Kearny, N. J.

Briefly, Mr. Davenport sought to

review studies of the isothermal transformation curves, or S-curves as they sometimes are called, to determine significance of these curves in heat treating operations, and to outline the major effects of various alloying elements on these curves.

It was found that, with the exception of cobalt, all alloying elements retard the transformation rate, or in other words move the S-curve to the right on the time axis, at the same time yielding harder, stronger and denser structures. In the order of the degree of retarding effect, the various elements were graded as chromium, molybdenum, vanadium, manganese, nickel and carbon—chromium having the greatest effect and carbon the least. Combinations of these elements were shown to exert unusual effects, with vastly different implications which should lead to future research along these lines in the field of alloy steels.

Future Work Suggested

Mr. Davenport propounded several questions which might be the basis for future investigations. Why do alloying elements alter the shape of the S-curves? How can the various alloys be selected to produce specific results? What are the relations between the isothermal curves and the continuous cooling curves?

A group of S.A.E. steels, whose isothermal curves were examined, included S.A.E. 2340, 3140, 4140, 4340, 4640, 5140, 6140, T1335 and a 5.5 per cent chromium—0.5 per cent molybdenum steel. Segregation and banding were two difficulties encountered in the experimental work, the cure for which was found to be a homogenization treatment at 2200-2250 degrees Fahr. for 48 hours in an inert atmosphere.

Examination of microstructures at various temperatures—1350, 1300, 1200, 1100, 1000, 900, 800, 700, and 600 degrees Fahr.—showed them to be lamellar at high temperatures and acicular at lower temperatures. Several apparently new structures were detected in intermediate ranges, one being an acicular ferrite, which was tentatively identified as *X*, or an unknown component, not considered to be pro-eutectoid ferrite.

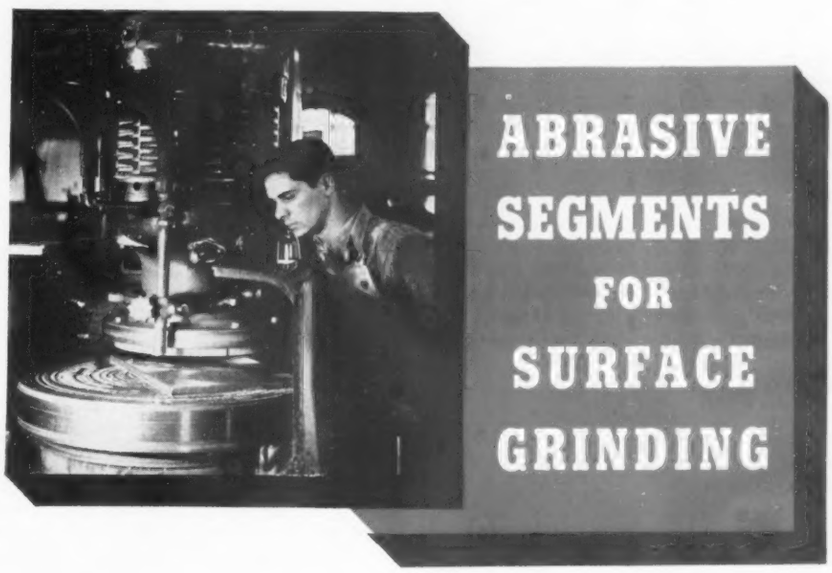
♦

Spiraled Steel Tubing Compares with Seamless

■ Steel tubing known as "Agalloyed," said to be comparable in quality and appearance to cold drawn seamless tubing and competitive in initial cost with joined seam tubing has been developed by AGA Metal Tube Co., Elizabeth, N. J.

Tubing is produced by joining spirally-wound cold-rolled steel strip in a hydrogen-atmosphere high-frequency induction furnace. To make a joint, constant pressure is applied to the spiraled strip at the moment of joining which is not relieved until the temperature of the tubing is reduced below freezing point of the bonding material. Decarburization is claimed to be entirely eliminated even in high-carbon steels as the actual heating and cooling cycles involve seconds rather than minutes.

The tubing can be made in all straight carbon steels as well as in chromium-vanadium, chromium-nickel and chromium-molybdenum steels. Sizes manufactured at present range from ⅝ to ⅛-inch outside diameter; wall thickness ranges from 0.042 to 0.010-inch. The tubing, which is said to possess particularly uniform wall thickness, is available in various tempers, depending upon the use to which it is put. It is furnished cold drawn and can be bent, coiled, expanded, flared, flanged, swaged, spun, machined, or welded. It will stand severe forming and with but little preparation the surface is suitable for plating.



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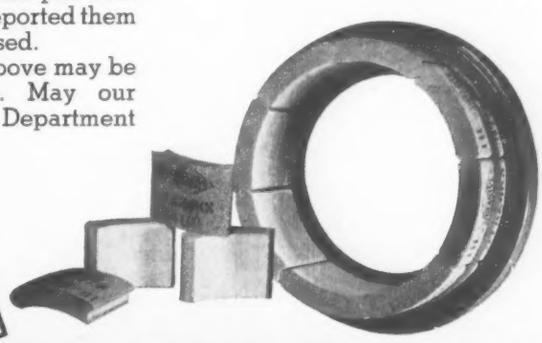

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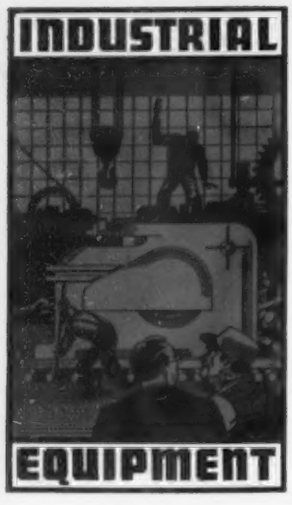
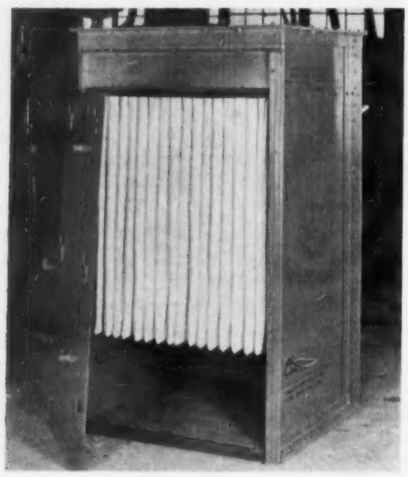


Low-Priced Dust Filter

■ A simple, compact, low priced dust filter is announced by W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, for service on individual machines needing exhausting or on auxiliary equipment for all types of dust conditions in connection with large dust filters. The flat cloth bags thoroughly cleanse the dust-laden air; they are shaken by hand to remove any clinging dust. Handle is shown on right side of filter.

The filter is furnished in four sizes



with a net cloth filtering area ranging from 88 to 352 square feet, handling an air volume from less than 350 to 1500 cubic feet per minute. Filter is shipped completely assembled and can be used on floor, mounted against a wall or suspended.

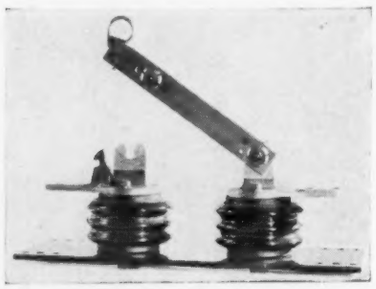
Plastic Gage Cover

■ A gage cover of nonbreakable, transparent plastic which threads onto the gage case is announced by Ashcroft American Gauge division, Manning, Maxwell & Moore Inc., Bridgeport, Conn. It is said to eliminate breakage of glass fronts on indicating gages.

Gage cover has a tensile strength of 5000 pounds per square inch and a compression strength of 15,000 pounds per square inch. Case is moisture and dust-proof.

Disconnect Switch

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new line of indoor disconnecting switches for hookstick or group operation. Available in ratings of from 200 to 6000 amperes for 5000-volt service and in sizes ranging from 400 to 6000 amperes for 7500 to 34,500-volt service. Multiple-line-pressure area, consisting of 30 silver-coated "sled runners" 0.005-inch wide on each blade, is provided. These line contacts, distributed over two rectangular areas about ½ x

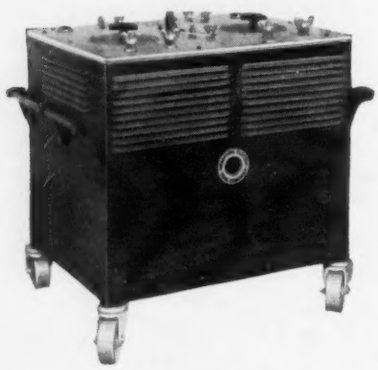


¾-inch resemble screw threads on a flat surface.

The operating eye and blade latch have been designed to produce a cam or pry-out action, which completely disengages the blades from the tongue member so switch opens easily after being closed for a long time. Increased flexibility and adequate contact pressure are supplied by a new type resilient spring-cup washer and locking device which requires no adjustment or maintenance after installation.

500-Ampere Welder

■ Hampton Electric Tool Co., 700 Walnut street, Pittsburgh, announces a new alternating-current welder which operates on either 220



or 440 volts and can be used by two operators simultaneously from 30 to 280 amperes each. By shifting a copper bar on top, welder can be used by one operator from 30 to 560 amperes.

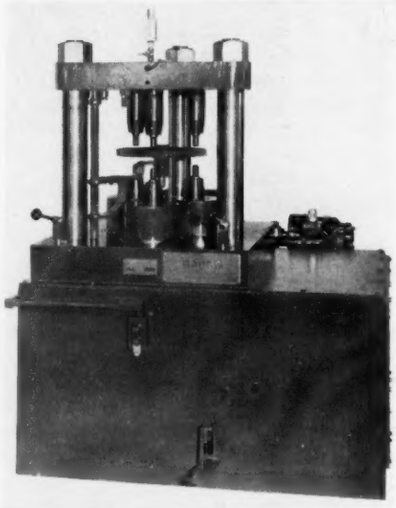
Welder takes electrodes from 1/16 to ½-inch diameter inclusive, making it possible to weld from the thinnest automobile fender to the heaviest casting. The 40 welding heats covering the entire range are controlled by two rotary switches.

The machine is 20 x 26 x 35 inches and weighs 460 pounds. It has large handles and is mounted on four ball-bearing casters.

Gear and Hub Assembly Riveter

■ A gear and hub assembly electric hydraulic riveter announced by Hanna Engineering Works, 1765 Elston avenue, Chicago, is of the strain rod and platen type and has three pairs of dies that drive three rivets 120 degrees apart simultaneously. Upper set of three dies is stationary. The rivets are headed by a set of three lower movable dies. Each pair of dies acts independently of the others, although tonnage on all pairs is exactly equalized. No harm to the assembly or press is claimed to result should less than three rivets be struck.

Press has a swingout arm and



mandrel for loading and assembly of the work. Rivets are inserted from above with the manufactured head up. When swing-out arm is swung in against stop, axis of assembly is accurately located in relation to dies. Operator rotates work until a set of three rivets comes into index with the dies. Depressing a foot treadle then causes the assembly to nest the rivet heads into the stationary upper die cups.

Press is controlled by two hand levers, a safety feature which assures that the operator's hands are free of dies. Press operates at 20 cycles per minute with a 3-inch stroke.

Stamps Nameplates

■ H. O. Bates, Elizabeth, N. J., offers a combination of an arbor press

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Reporting News and Technical Developments of Copper and Copper-Base Alloys

NOVEMBER "Bridgeport" BRASS CO. 1939

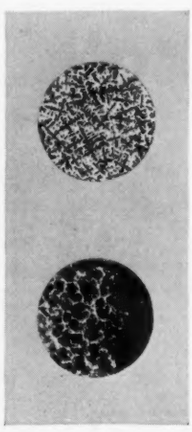
DIP BRAZING PROCESS HAS MANY USES

The dip brazing process offers interesting possibilities for joining metals where furnace brazing is not applicable. The method is particularly applicable to the joining of ferrous metals by means of alloys of copper and zinc. Essentially, it consists in dipping the parts to be joined into a flux-covered molten brazing material, contained in a refractory crucible.

Recent studies show that the copper-zinc alloys possess definite advantages for dip brazing, because of the high strength and ductility which they show after the brazing operation. A copper-zinc ratio of approximately 57-43 appears to have excellent properties. Lower percentages of zinc apparently are less satisfactory, because of the increased width of the brittle range. This factor is of great importance, because the brazed joint must withstand the thermal contraction of the metals. Small additions of iron, manganese, and phosphorus to the brass are said to have a desirable effect, while the presence of nickel, aluminum, lead, silicon, or arsenic is disadvantageous.

Dot Photography Throws New Light on Metals

Dot photography—a new type of X-ray microradiography—offers unusual possibilities for the solution of metallurgical problems. Developed by Dr. George L. Clark, of the University of Illinois, the new technique uses an X-ray beam no larger than the diameter of a lead pencil to photograph the internal structure of the metal. The method gives a clear delineation of grain boundaries, and shows every trace of segregation of one metal in another. Upper photo shows dark lines of lead in a leaded bronze. In the lower photo, white lines indicate segregation of copper in an alloy of aluminum and copper. The alloy was regarded as a homogeneous solid solution until the dot photography technique detected the copper segregation.

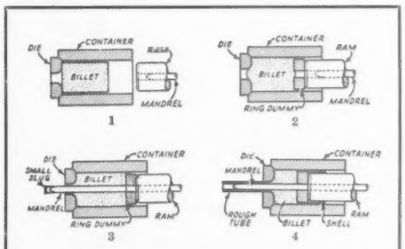


BRIDGEPORT INSTALLS NEW EQUIPMENT FOR EXTRUSION OF SEAMLESS TUBING

Production Facilities Expanded to Meet Increasing Demand For the More Refractory Corrosion-Resisting Alloys

With the installation of new extrusion equipment, Bridgeport Brass Company has expanded its facilities for the production of seamless tubing, particularly in the extremely corrosion-resisting alloys required for present-day condensers and heat exchangers.

Current trends in the operation of condensers and heat exchangers are bringing about more severe corrosive conditions. High operating temperatures and efficiencies and continuous operation at top load combine with an increase in the corrosive effect of cooling water in many localities to cut down the life of ordinary alloys. These conditions must be met by the use of alloys with a greater resistance to attack.



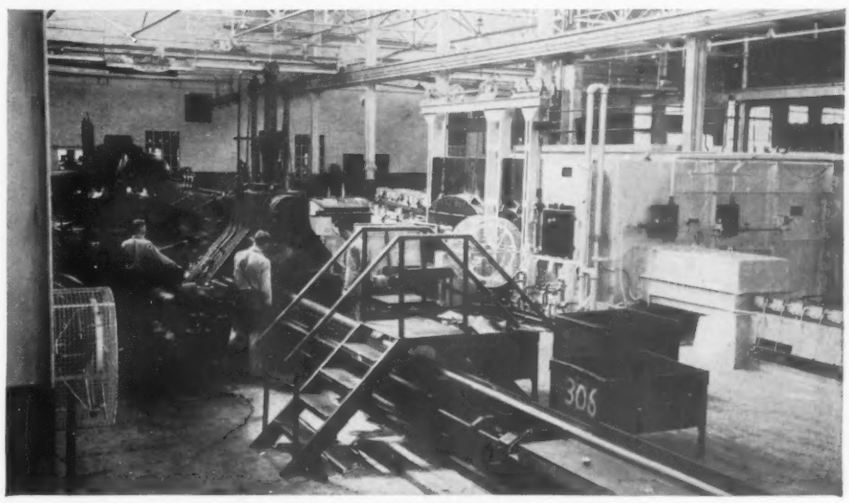
These drawings illustrate the various steps in the process of extruding seamless tubing from a solid billet.

Bridgeport's extrusion equipment is designed primarily to meet the increasing demand for these alloys. While it is capable of processing most of the copper alloys from brass to bronze, it is intended chiefly to enlarge Bridgeport's facilities for producing the more refractory, corrosion-resisting alloys, such as Duronze* IV (Aluminum Bronze), Cuzinal* (Aluminum Brass), and Cupro Nickel.

Tubing Formed From Red-Hot Billets

In the extrusion press solid billets of these refractory alloys, after being heated to a semi-plastic condition, are formed into heavy walled tube under the action of tremendous pressures. In the process, a mandrel operating through a ram is first pushed through the center of the billet until the mandrel reaches the die. The mandrel then floats in the die, while the ram pushes the metal, causing it to flow between the die and mandrel to form a tube. Successive drawing and annealing operations are applied to reduce the large,

(Continued on Following Page, Column 2)



Bridgeport's new tube extrusion equipment gives increased facilities for the production of seamless tubing, particularly in the refractory alloys which are now in wide demand for condenser and heat exchanger applications.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the fifth of a series of articles on the properties and applications of the copper alloys, and begins the subject of Rich Low Brass.

RICH LOW BRASS

The term "Rich Low Brass" is used to cover in general the copper-zinc alloys containing about 85% copper and the remainder zinc. This alloy is also called "Red Brass," although the latter term is sometimes used to cover material ranging between 82 and 88% copper. Alloys containing slightly less than 82% copper are commonly referred to as "Low Brass."

In each case the word "Low" refers to the low quantity of zinc in the alloy, rather than the quantity of copper, and may be thought of in this connection as contrasted with High Brass, which contains a higher quantity of zinc.

Alloy is Readily Formed

The standard alloy sold as Rich Low Brass contains from 84 to 86% copper. This alloy may be obtained in all the common forms, such as sheet, rod, wire, and tubing. Because of its ductility, it may be readily formed into a variety of shapes. The alloy is perhaps the best of the copper-zinc group from the standpoint of combined ductility, strength, and corrosion resistance.

Physical Properties

The following table lists a few of the more important physical properties of the 85-15 alloy. (Next month's issue will discuss further the properties of Rich Low Brass, with specific reference to effect of annealing and cold working and to various types of application.)

Specific Gravity	8.73
Density	.316 lbs./cu. in.
Coefficient of Thermal Expansion	0.0000098/deg. F. (77°–212° F.)
Thermal Conductivity	.380 cal./sq. cm./cm./sec./°C at 20° C
Thermal Conductivity (Copper 100%)	41.0%
Electrical Resistance	28.03 ohms/cir. mil ft.
% Electrical Conductivity (I. A. C. S.)	37.0
Modulus of Elasticity	15,000,000 lbs./sq. in.
Tensile Strength—Lbs./sq. in.	
Annealed Sheet	40,000–46,000 lbs./sq. in.
Hard Sheet	65,000–72,000 lbs./sq. in.
Elongation, % in 2 inches	
Annealed Sheet	35–50%
Hard Sheet	2–10%
Standard Specifications (A. S. T. M.)	B36–39T

Memos on Brass—No. 3

Brass is ideally suited for the manufacture of parts by the popular cold heading process. It has the necessary malleability before working, and develops great strength without brittleness in the forming process. It reduces waste in the process.

NEW TUBE EQUIPMENT

(Continued from Preceding Page, Column 3)

heavy walled tube to the sizes required for condensers and heat exchangers.

The installation of the extrusion press is the latest step in Bridgeport's comprehensive program of modernization and expansion—a program specifically planned to anticipate the most exacting engineering requirements of the users of copper alloys in the form of sheet, rod, or tube.

Soldering Method for Tubes

A patent has recently been issued on a new process for soldering together copper-containing surfaces, such as those of flanges and tubes. The method involves the use of a solder consisting of cadmium, copper, silver, and zinc. Further information on this patent can be obtained by writing Bridgeport.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. Further information on any of these items may be obtained by writing the Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

A new cleaning agent is reported to provide rapid, thorough cleaning as a preparation for electroplating or other finishes. It is particularly suitable before bright plating. It is used at high concentration and high current density with reverse current.

A heat-resisting compound is designed for use when welding near rubber, wood, glass, metallic platings, or other substances that might be affected by the welding heat. It is said that it can be washed off with clean water and used again.

A lining material is especially suitable for protecting tanks used in plating and pickling operations, according to the manufacturer. It is not affected by strong oxidizing agents, such as concentrated nitric, sulphuric, or chromic acids. It is also said to be non-absorbent, so that tanks lined with it can be used first with one and then with another solution.

Stampings without dies are possible in short runs with a new machine, it is reported. Manufacturer's literature explains the process and the machining operations possible.

A baking enamel simulates the effect of brass, aluminum, steel, or other metals on any polished metal. It resists the action of cleaning operations and plating baths, according to reports, and can therefore be used to give a wide variety of effects by sectional application. Flat stock finished with the enamel can be formed.

A bright dip process for cadmium plate is described in a new leaflet. It is said that the process provides a final treatment that will improve the properties of cadmium deposits and attain brightness and uniformity of appearance.

Recessing tools are suitable for use on automatic screw machines or turret lathes. In operation, the face of the tool strikes the work, stopping the forward movement, and the rear portion moves forward, feeding the tool bit into the work by cam movement.

Remote control for welding apparatus allows the welding current to be adjusted without interrupting the work or breaking the arc. It is said to give the welding operator constant finger-tip control of welding heat, with consequent improvement in the quality of the work.

A combination tool is said to be suitable for grinding, light drilling, polishing, sanding, and filing operations. It is available in types for portable or bench work. Tool can be operated in close quarters.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,** for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers; oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

BRASS "Bridgeport" CO. *Established 1865*

COPPER WATER TUBE AND FITTINGS—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite"* for plumbing, underground and industrial services.

*Trade-name.

BRIDGEPORT BRASS

and Hercules holder with type and necessary fixtures for stamping name plates or parts with lettering or numbering. The pin adjustment is made to suit the line spacing on the name plates, and a square ram insures parallel line stamping. Arbor press has a leverage ratio of 50 to 1, and is suitable for stamping up to eight ⅛-inch size figures in stainless steel plates or the equivalent of four times this in aluminum. The anvil block has a pin adjustment and can be furnished with a wider face than illustrated for larger name plates or parts.

Vertical Hydraulic Press

■ Denison Engineering Co., Columbus, O., offers vertical hydraulic press type DLAC 1 with working capacities of 5, 15, 25 and 50 tons for assembling, broaching, straightening and general production pressing. Press cylinder assembly consists of an accurately finished steel cylinder fitted with nickel iron cylinder heads,

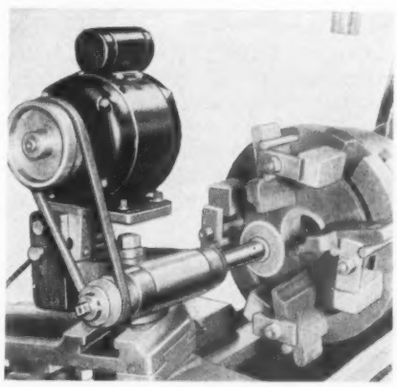
piston, steel piston rod and self-sealing packing. It is flange-mounted in the upper portion of the "C" frame. Also located in the upper part of the frame, behind the cylinder, is the hydraulic pump, which is integrally flange-mounted on its driving motor.

The 6-inch diameter ram of the 50-ton machine is guided against rotation by machined alloy guides in the throat of the press. Motor starter and controls also are located within frame. All corners and edges of the frame are rounded and ample toe space for the operator has been provided.

Specifications of the 50-ton machine are: Maximum stroke of 26 inches and maximum vertical opening of 29 inches. Depth of throat is 10 inches, and standard plate size is 15 x 15 inches. Ram speed is 7 feet per minute down and 15 feet per minute up. Normal working pressure is 2000 pounds per square inch. Oil reservoir capacity is 50 gallons.

Tool-Post Lathe Grinder

■ An all purpose tool post lathe grinder is announced by R. G. Smith Tool & Mfg. Co., Newark, N. J., featuring automatic and correct belt tension with no sliding of the motor or other adjustment necessary. Eight speeds are obtainable by switching the pulley and the sheave and compensation for wear is easily made without disassembling. The

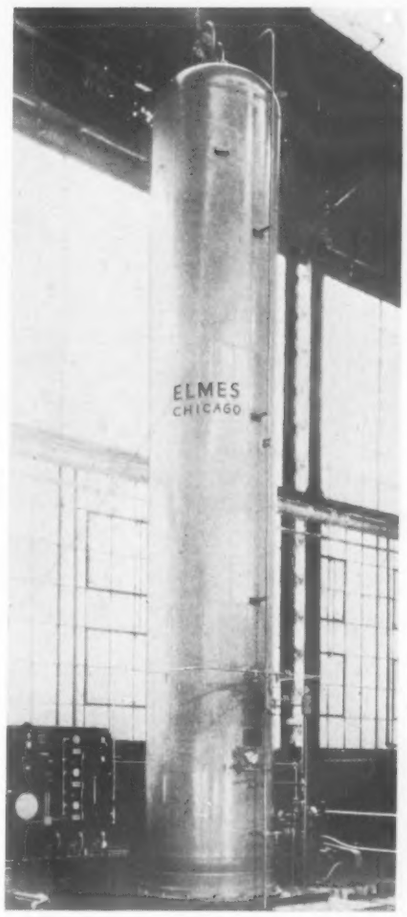


motor is dynamically balanced and a vibration-absorbing spring is provided which prevents transmission of any vibration to the spindle.

Air Ballasted Hydraulic Accumulators

■ Air ballasted hydraulic accumulators announced by Charles F. Elmes Engineering Works, Morgan and Fulton streets, Chicago, are claimed to eliminate line shocks and hold pressure variations to a minimum by the use of compressed air. The accumulator has no internal packings and no internal moving parts to get out of order and necessitate exhausting air and liquid for repairs.

A higher degree of efficiency is



available with this type machine. Excessive withdrawal and overcharging are guarded against. Electric power failure or operating air failure immediately renders the accumulator inoperative. The unusually light weight of these accumulators makes installation on ground or upper floors easy, with pits and foundations necessary only in exceptional cases.

Electroplating Rectifier

■ P. R. Mallory & Co. Inc., Indianapolis, Ind., annouces the Rectoplater, a static device which converts

alternating current directly to direct current for electrolytic processes by means of a stepdown transformer and a rectifier using a cooling system. Control of the direct-current output of Rectoplaters is by means of a multipoint switch selecting different transformer primary taps. The direct-current voltage at full load is approximately 85 per cent of the direct-current voltage at no load. Magnesium-copper sulphide dry disk type of rectifier is used because of its ability to rectify the heavy currents required for electroplating with the minimum amount of material and parts.

The efficiency of the device remains practically constant at 50 to 55 per cent over the complete range of different sizes. Power factor is near unity over most of the useful operating range. The Rectoplater can be used immediately after being turned on.

Demand Regulator

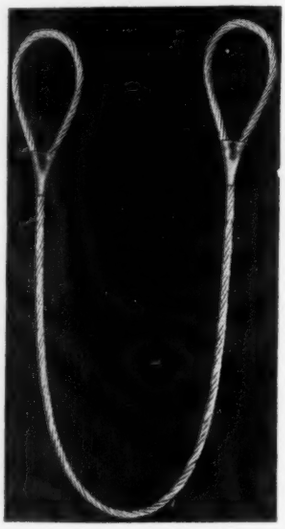
■ The KW Demand Regulator announced by T. Starling Winters, 182 Main street, East Orange, N. J., is an automatic device that maintains the maximum power demand at a minimum value for a given consumption of electrical energy. It

maintains a "running average" of the desired load for the equipment and permits heavy overloads of short duration to be handled without interruption of power at any time. The unit controls the magnitude as well as the duration of short-time variations in power by continuously integrating the product of power and time on a differential, inverse, time-load basis.

The regulator is entirely self-contained in a dust-tight case of nonrusting materials. Jewel bearings and vacuum-sealed control contacts are used. A 500 per cent range of kilowatt demand adjustment assures flexibility in the operation. No synchronization with other devices is necessary. Negligible power consumption permits operation entirely from instrument transformer circuits. Regulator also can be furnished with automatic time-clock selection of two separate demand settings for the control of both daylight and "off-peak" demand.

Loop-Eye Sling

■ Safety to workmen's hands and higher efficiency are claimed by Macwhyte Co., Kenosha, Wis., for its improved loop-eye sling of Mac-

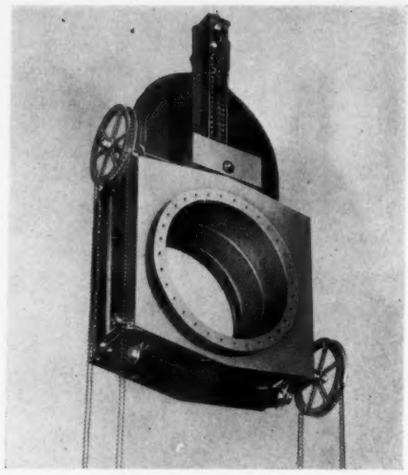


whyte PREformed Whyte strand (improved plow steel) wire rope. The sling is streamlined by the wedge shaped "Y-Guard" steel ferrule so it is easily pulled out from under loads and is safer to handle. Protruding ends or wire seizing of the conventional eye splice is eliminated. The loop eyes easily encircle crane hooks. The higher efficiency of this sling is comparable to that of a sling equipped with sockets.

Plate-Type Gas Valve

■ H. A. Brassert & Co., 436 Seventh avenue, Pittsburgh, has put on the market a plate-type gas valve which operates in a straight line rather than as a goggle and is capable of location and operation in any position—vertical, horizontal or inclined. Valve structure has sufficient beam strength to require no support from the ground. Valve is self-contained in that it embodies an expansion joint, the retracting mechanism being completely independent of the structure of the valve body.

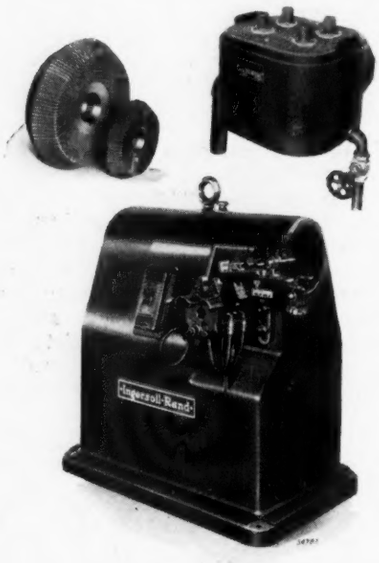
Movement of the clamping flange is positive in both directions. Valve opening is equal to the diameter of the pipe and is free from obstruction to the flow of gas. Valve plate is sufficiently stiff to avoid accidental distortion and to maintain a tight joint. Valve is capable of positive mechanical movement in both directions and has full counterweighting when operated vertically.



The construction is adapted to the use of either hot or cold gas. The operating mechanism of the valve is on the outside for easy examination. Contacting surfaces are of noncorrosive material.

Drill Bit Reconditioner

■ Ingersoll-Rand Co., Phillipsburg, N. J., has developed the Jackmill hot milling machine for reconditioning its detachable rock drill bit, the Jackbit. Built in two sizes, the JMA redresses 40,000 to 60,000 bits at a rate of 110 to 180 per hour and



the JMB 15,000 to 30,000 at 75 to 90 per hour. Both have electric motor drive. Feed mechanism of the JMB is air-operated.

A single cutter which can be reconditioned a number of times both gages and sharpens. Cutter cost per bit sharpened runs less than one-tenth of a cent. A slight flow of metal during milling operations makes it possible to hold the bit's gage size longer, thus, it is claimed, increasing the life of the Jackbit 30 to 50 per cent.

Automobile Transmission

(*Concluded from Page 52*)

be expressed in terms of three separate displacements: Change in gear distance, movement along gear axis, gear tip or angular displacement of the axes. The last, or gear tip movement, is the only one affecting alignment, thus simplifying test.

A comparison of displacement angles revealed by this test indicated that the second gears had the best alignment and that the low gears had better alignment than the head gears. Comparing these results with the test life data, there was found an excellent correlation, indicating that deflection test results show a definite relation to gear life.

From data obtained on the previous experimental work, it was determined that increasing the torque load from 250 to 300 foot-pounds would decrease expected life of the low gear by 60 per cent. Using final production gear test values of 20 hours as the basis on which to predict the life at 300 foot-pounds torque, an expectancy of 8 hours was obtained, which still showed a factor of safety of 3.1 to 1 when compared with minimum life requirement of 2.6 hours. This would be perfectly satisfactory if it were possible to obtain at least 8 hours of life consistently.

Confirming Tests Made

To confirm this, a series of tests was conducted on the low gears at 300 foot-pounds torque. One test showed 5.5 hours, and another 10.3 hours. Another group of tests showed life from 4.5 to 12.32 hours. Sometime later another set of tests showed life had been lengthened to range from 10.7 to 20 hours. These latter were on production transmissions which, of course, showed an increase in life due to factors outlined above.

However, the latter group exhibiting greatly increased life included special attention to tooth contacts, a new factor which had a definite bearing on these improved results. Only rear contacts were used—no front contacts being allowed. Pictures taken under light load with the gears assembled in the case before the test started permitted comparison of length of contact with resulting life, and so afforded means of determining length of contact.

As noted above, minimum life in second group without contact control was 5.5 hours, whereas minimum life in the third group with contact control was 10.7 hours, a 100 per cent improvement. With 2.6 hours minimum life allowable, this is a 4.4 safety factor.

The 300-foot-pound torque tests with transmission in second gear also were started with production gears. These transmissions differed from those in the previous tests at 250 foot-pounds in that ratio was changed. Clutch gear previously with 18 teeth now had 17. This change increased the stress to 71,000 pounds per square inch, reducing expected life from 18.75 hours at 250 foot-pounds to only 4.44 hours at 300 foot-pounds, a 76 per cent reduction.

On two of the first three tests, the second counter gear failed at 7.25 and 5.83 hours respectivey. As minimum requirement was 7.0 hours, this was unsatisfactory. Deflection tests had shown the clutch gear weak, so shaft diameter was increased from 1⅛ to 1 9/32 inches. These stronger clutch gears performed well in the next two tests, but the second counter gear again failed, one at 7.16 and the other at 10.67 hours.

Consequently, gear tooth was increased in length by ⅛-inch, 1/16-inch being added to both front and rear of the tooth. On first subsequent test, bearing failed at 20.5 hours and on the two following tests clutch gear again failed at 11.5 and 12 hours respectively. Next two tests showed 13.25 and 10.2 hours respectively. On the last test, exceptionally long life of 40 hours was obtained without failure.

In the next group of tests, production gears which had been relapped to certain definite tooth contacts were used. No gear failures occurred in 40 hours of testing.

Elimination of the large transmission from the factory setup was important as a total of $600,000 was tied up in machine tools and equipment used for its production.

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Disposal of Waste Acid Proves a Big Problem

(*Concluded from Page 60*)

strip mills contains from 6½ to 7 per cent free acid, he stated.

Making an intensive study of pickling operations often results in lowering the cost of cleaning. The speaker cited one plan as having saved a tank car of acid a week after making an investigation in the pickling setup.

The best method of treating the rinse water in pickling departments before discharging it into a stream is by neutralization, Mr. Hodge contended. Many steel plants have alkali wastes also and if these are run into the river on a graduated basis there should be no difficulty in allowing the waste pickle to discharge into the river so long as it is in proportion to the alkaline waste. In conclusion, he made a plea to avoid critical conditions in streams, that is, the acid should be dumped into a stream gradually.

Material Handling in Modern Machine Tools

(*Concluded from Page 49*)

this type of machine, the motion of the work table is continuous and is timed to carry the work under the wheel at the proper rate of feed. This gives ample time for unloading and loading at the operating position.

A more obvious example of material handling means built into a production machine tool is given by the Cincinnati hydro-broach illustrated by Fig. 4. This is a special machine used by the Studebaker Corp. for rough and finish broaching the bearing locks and the half-round crank bore of Champion cylinder blocks. It is typical of the many applications made of the broaching method of machining in the automotive industry and is capable of handling 60 blocks per hour.

Heavy Lifting Eliminated

Note that in this case heavy lifting and sliding has been eliminated by built-in roller conveyor elements which deliver the blocks to the hydraulically operated clamping fixture and which allow its easy removal therefrom. Locating and clamping therefore has had both its physical and mental hazards removed by advanced fixture engineering and by applying to the holding elements of the machine the same dependable and easily controlled power which serves to drive the broaches through the work.

Practically every modern production machine tool deserves careful study from the standpoint of the ingenious material handling principles and mechanisms which have been designed into it or applied to it in connection with its tooling. Any sales engineer who is so blinded by amazing cutting speeds and feeds that he neglects to make clear to the prospect the material handling advantages likewise embodied in the machine he is trying to sell, may be overlooking the most effective three-quarters of his selling story.

By the same token any production man who forces the machine to the limit as far as its metal removing ability is concerned, but who neglects to take full advantage of every possible advantage of the machine's material handling ability, may be subjecting the machine and tool to 100 per cent strain and wear and getting only 50 per cent of its effective production. Such operation is fully as inefficient and unduly abusive of a fine machine tool as is operation of a fine automobile with the throttle wide open and the emergency brake on.

Clamshell Buckets

(*Concluded from Page* 54)

structure is used as a means to co-ordinate the scoop members, with the result that the guide rail for the lower sheave block does not have to extend downward into an unsupported and vulnerable position.

This guide rail problem has been common to buckets of this type, and its elimination has made it possible to reduce materially the proportions of the upper structure. The upper structure thus is kept within the boundary of the scoops or trays; in other words, the overall width of the bucket is represented by the scoops rather than by the housing above the scoops. Thus the scoops, rather than any unsupported portion of the structure, are exposed to the abuse which such buckets commonly receive. The scoops, of course, are replaceable and are designed to withstand abusive service.

Alloy Steels Used

High strength alloy steels used increase durability and effect a more favorable ratio between pay load and dead load. Sheaves are mounted on sealed antifriction bearings. Cables, where they enter the head of the bucket, are protected by hardened steel guide rollers which also are fitted with antifriction bearings.

Streamlining of all outside surfaces minimizes damage to lake boat hatchways. Exposed rivets on the upper structure are countersunk.

Toggle link assembly is entirely welded, and a major portion of the upper structure also is welded. Crosshead, or lower sheave housing, as well as the upper sheave housing which forms the head of the bucket, are fabricated entirely by welding. Such parts are annealed after welding. The scoops are riveted to facilitate renewal.

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Metal Finishing—Cont'd pH Papers

(*Concluded from Page* 53)

curate results are not required. Each of these strips has five indicators, but control colors are on a separate color chart which permits checking against the following pH values: 2.0, 3.8, 4.0, 4.3, 5.0, 6.0, 6.3, 6.5, 7.0, 8.0, 8.5, 9.5, 12.0. In-between values can be estimated. This strip also indicates whether pH is below 2.0 or above 12. Where desired, after obtaining approximate pH value with this strip, strip of another series can be used for more precise indication.

A special series of pH papers which indicates in steps of 0.3 pH has been developed for the electroplating industry. Range in application of this series of seven papers is as follows: 5.2 to 6.7 pH for cold nickel solutions; 3.6 to 5.0 pH for warm nickel solutions; 3.7 to 5.3 pH for acid zinc solutions only; 1.9 to 3.4 pH for acid copper, low pH nickel and similar solutions; 0.9 to 1.5 pH for acid copper solutions; 9.2 to 11.0 for cyanide brass, copper, silver and cleaning solution; 11.0 to 13.5 pH for cyanide copper, cadmium, zinc, tin and various cleaning solutions. This latter paper is in steps of 0.5 pH.

This exceedingly simple method of determining accurately pH values is expected to increase rapidly in its acceptance due to its great saving in time and to the fact that no apparatus is required

TABLE I—SERIES A

(For Buffered Solutions)

Nos.	*pH Range*	*Color-range*	*Control Colors in Steps of 0.3 pH:*							
1637	1.6—3.7	Purple-orange	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7
2641	2.6—4.1	Yellow-violet	2.6	2.9	3.2	3.5	3.8	4.1		
3954	3.9—5.4	Yellow-blue	3.9	4.2	4.5	4.8	5.1	5.4		
5267	5.2—6.7	Yellow-purple	5.2	5.5	5.8	6.1	6.4	6.7		
6075	6.0—7.5	Yellow-blue	6.0	6.3	6.6	6.9	7.2	7.5		
6681	6.6—8.1	Yellow-blue	6.6	6.9	7.2	7.5	7.8	8.1		
8297	8.2—9.7	Yellow-blue	8.2	8.5	8.8	9.1	9.4	9.7		

♦

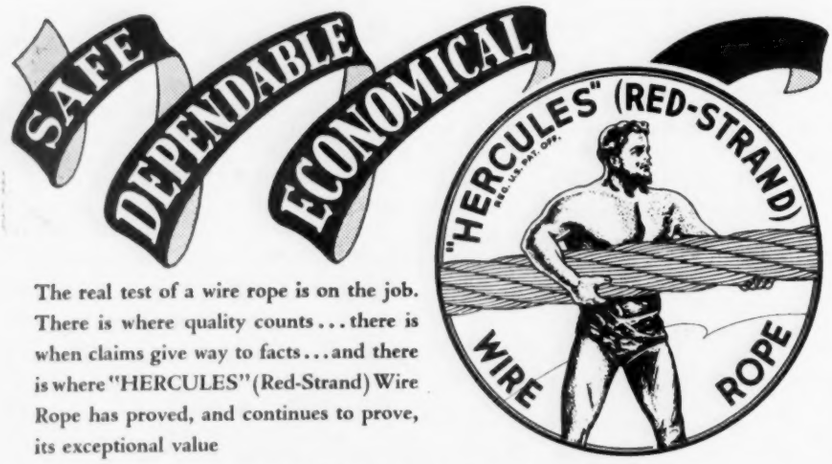
Mirrors of Motordom

(*Concluded from Page* 38)

1. Added values built into the lower-price Ford for 1940, plus the good economy of this engine, probably are responsible for the reversal of the trend toward deluxe models.

Recently installed in the Ford Rouge plant is a new continuous gas carburizing furnace for pinion gears, said to be the only one of its kind in the world. Operation is completely automatic except for charging the untreated gears and removing them for a hand quench. Ford also has started installation of a second line of furnaces, presses and washing equipment for production of steel cylinder liners. Peak output of these two lines will be around 1800 sleeves per hour.

Vague reports are heard of a new high-frequency welding process developed here by a Danish inventor. Equipment is said to be in operation on one production part for the Chrysler lines and experimental work has been initiated on a second installation in another plant. The development recalls discussions in the technical press three years ago (STEEL, June 22, 1936) concerning the method of welding by "molecular shock" invented by Dr. Antonio Longoria, Cleveland.



The real test of a wire rope is on the job. There is where quality counts . . . there is when claims give way to facts . . . and there is where "HERCULES" (Red-Strand) Wire Rope has proved, and continues to prove, its exceptional value

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Steel Output Near Practical Capacity

New Peak in Pig Iron Production Seen For November

MARKET IN TABLOID ★

Demand
Sustained; first quarter bookings increasing.

Prices
Strong; only small advances expected next period.

Production
Up 1 point to 93 per cent.

■ PIG iron production in October soared to the best level ever attained in that month and was within 7 per cent of the all-time high established in May, 1929.

Daily average output was 116,990 tons, 22.1 per cent larger than in September and 75.5 per cent higher than a year ago. Production for the first ten months totaled 24,038,418 tons, a gain of 67 per cent over the 1938 period. Since the 188 blast furnaces active Oct. 31 was a net gain of 19 over the number of stacks operating Sept. 30, a further increase in output is indicated for November.

Also indicative of the steel industry's haste to enlarge raw material supplies is the October movement of 9,201,249 tons of Lake Superior iron ore from upper lake ports. This was the largest total for the month since 1926 and 154 per cent more than was shipped a year ago.

Meanwhile, steelmaking still is edging upward slightly, last week being up 1 point to 93 per cent to establish another new record for weekly tonnage. Additional plants have reached their capacity limit. Theoretical capacity is being exceeded by some steelworks, but shutdowns of open-hearth furnaces for repairs occasionally are retarding operations elsewhere.

Continued postponement of first quarter price announcements and growing belief among steel buyers that advances for that period will be neither sweeping nor large have been without major influence on shipments. Mills still are being pressed for delivery, and first quarter orders for some products are growing steadily.

Buyers not already protected by prior coverage find it increasingly difficult to place business in most products for delivery before next year. This is particularly true of bars and flat-rolled steel. Pipe and structural shape producers face less serious delivery problems, while plates still are available at the higher price instituted by some makers a number of weeks ago.

Effect of the embargo repeal on steel demand for domestic requirements has yet to be determined. Potential export business has been a factor in buyers' decision to anticipate future needs in order to avoid delayed deliveries, but steelmakers have been disposed to accommodate domestic users' requirements before loading books with foreign orders.

Extent of current steel shipments going into buyers' inventories is a moot question. Strictly speculative tonnage bought in anticipation of higher prices and without indicated need for the material within the next few months is regarded as small. Some additions to inventories have been necessitated by heavier operations of consumers. At the same time, stocks of certain articles manufactured from steel are being expanded.

Railroads figure prominently in the upturn in steel consumption, with additional business appearing in equipment and track material. Last week's freight car orders exceeded 5000 and brought awards for the first ten months to the highest total since 1929. Most leading roads now have covered future rail needs, additional purchases lately totaling 31,000 tons.

Rail orders the past two months were substantially larger than a year ago, because few roads entered the market for 1939 requirements until November and most buying occurred the first quarter of this year. An increase of about 20 per cent in 1940 rail needs compared with 1939 orders is shown in recent purchases by 20 leading carriers.

Relatively heavy demand continues for structural shapes and concrete reinforcing bars. Pending tonnage in the latter is large compared with the scant mill capacity still open for the next few months. Last week's bar awards were headed by 12,093 tons for a Chicago filtration plant.

The maritime commission has placed two more cargo boats, taking 5400 tons of steel for hull and superstructure. Gulf Oil Corp. has placed a 23,000-ton pipe line.

All steelmaking districts operated at unchanged or higher rates last week. Gains included 2 points to 93 per cent at Pittsburgh, 1 point to 91 at Chicago, 2 points to 80 in eastern Pennsylvania, 10 points to 100 in New England, 2 points to 90 at Cincinnati and 5 points to 100 at Detroit. Unchanged were Youngstown at 92, Wheeling at 93, Cleveland at 90, Buffalo at 93, Birmingham at 94 and St. Louis at 80.

Scrap markets are uneventful but generally steady, with the price composite unchanged at $20.83. An advance of $10 a ton in ferromanganese by one leading seller has yet to be followed by other interests.

COMPOSITE MARKET AVERAGES

	Nov. 4	Oct. 28	Oct. 21	One Month Ago Oct., 1939	Three Months Ago Aug., 1939	One Year Ago Nov., 1938	Five Years Ago Nov., 1934
Iron and Steel	$37.62	$37.56	$37.56	$37.62	$35.95	$36.39	$32.15
Finished Steel	55.90	55.90	55.90	55.90	55.60	56.68	54.00
Steelworks Scrap	20.83	20.83	21.00	21.45	15.30	14.58	9.82

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Nov. 4, 1939	Oct. 1939	Aug. 1939	Nov. 1938
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.25c
Steel bars, Chicago	2.15	2.15	2.15	2.25
Steel bars, Philadelphia	2.47	2.47	2.47	2.57
Iron bars, Terre Haute, Ind.	2.15	2.13	2.05	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15-2.40	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.00	2.00	2.00	2.15
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.00	2.00	2.00	2.15
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.10
Wire nails, Pittsburgh	2.55	2.50	2.40	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	43.00	43.00	43.00	43.00

Pig Iron

	Nov. 4, 1939	Oct. 1939	Aug. 1939	Nov. 1938
Bessemer, del. Pittsburgh	$24.34	$24.34	$22.34	$22.34
Basic, Valley	22.50	22.50	20.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	22.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	22.21	22.21
No. 2 foundry, Chicago	23.00	23.00	21.00	21.00
Southern No. 2, Birmingham	19.38	19.38	17.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	20.89	20.89
No. 2X, del. Phila. (differ. av.)	25.215	25.215	23.215	23.215
Malleable, Valley	23.00	23.00	21.00	21.00
Malleable, Chicago	23.00	23.00	21.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	28.34	28.34
Gary forge, del. Pittsburgh	23.17	23.17	21.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	85.33	97.77

Scrap

Heavy melting steel, Pittsburgh	$22.75	$23.15	$16.15	$15.15
Heavy melt. steel, No. 2, E. Pa.	20.25	20.00	14.40	12.75
Heavy melting steel, Chicago	18.75	19.25	13.75	14.20
Rails for rolling, Chicago	21.25	21.90	17.75	17.40
Railroad steel specialties, Chicago	21.75	21.75	15.50	16.10

Coke

Connellsville, furnace, ovens	$5.00	$4.75	$3.75	$3.75
Connellsville, foundry, ovens	6.00	5.80	5.00	5.00
Chicago, by-product fdry., del.	10.50	10.50	10.50	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.00c
Chicago, Gary	2.00c
Cleveland	2.00c
Detroit, del.	2.10c
Buffalo	2.00c
Sparrows Point, Md.	2.00c
New York, del.	2.24c
Philadelphia, del.	2.17c
Granite City, Ill.	2.10c
Middletown, O.	2.00c
Youngstown, O.	2.00c
Birmingham	2.00c
Pacific Coast points	2.50c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast points	3.65c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast points	4.00c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.50c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c-2.54c
Philadelphia, del.	2.15c-2.40c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.35c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c-2.35c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c

Standard Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast points	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast points	2.75c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast points	2.75c

Iron

Chicago, Terre Haute	2.15c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

Reinforcing

*New Billet Bars, Base**

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

*Rail Steel Bars, Base**

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

**Base prices 20 cents less per 100 lbs. in lots of 20 tons or over of one size, in lengths of 30 feet or over, for shipment at one time to one destination.*

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per pound)	
Polished fence staples	2.55c
Galv. barbed wire, standard 12½ gage two-point hog, 80-rod spool $2.88; two-point cattle, 80-rod spool	$2.70
Annealed fence wire	2.90c
Galv. fence wire	3.30c
Woven wire fencing (base C. L. column)	67.00
Single loop bale tie, (base C. L. column)	56.00

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.65c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh $3.70

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c

Detroit, delivered 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.00c
Detroit, del.	2.10c
Philadelphia, del.	2.32c
New York, del.	2.36c
Pacific Coast points	2.60c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.10c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, for full containers additional 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
6-inch and less	67	70
⅞-1-inch	64	65
1⅛ and larger	62	62

Hexagon Cap Screws

Upset, 1-in., smaller ..... 70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific coast ports	2.90c

Rivets, Washers

Structural, Pittsburgh, Cleveland, Chicago	3.40c
⅞-inch and smaller, Pitts., Chi., Cleve.	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers	
and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75	off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½ "O.D.	13	$ 9.72	$23.71
1¾ "O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼ "O.D.	13	13.79	21.68
2¼ "O.D.	12	15.16	.....
2½ "O.D.	12	16.58	26.57
2¾ "O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½ "O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼ "O.D.	13	9.26	10.67
1½ "O.D.	13	10.23	11.79
1¾ "O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼ "O.D.	13	14.54	16.76
2¼ "O.D.	12	16.01	18.45
2½ "O.D.	12	17.54	20.21
2¾ "O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½ "O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½ "O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl.	43.00
Do., over ⅝ to 11/32-in.incl.	48.00

Worcester up $2; Galveston up $6; Pacific Coast up $9.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$5.00- 5.50
Connellsville, fdry.	5.75 -6.25
Connell. prem. fdry.	6.00- 6.50
New River fdry.	6.50- 6.75
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	8.25
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	22.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	6.75c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.45	25.45	24.95	24.95
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $27.50; 6.51-7—$28.00; 7-7.50—$28.50; 7.51-8—$29.00; 8-8.50—$29.50; 8.51-9—$30.00; 9-9.50—$30.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Do. domestic	40.00
Do., f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Quickset magnesite grains, f.o.b. Chewelah, Wash., net, bulk	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$47.00
Chem. bonded chrome	47.00
Magnesite brick	67.00
Chem. bonded magnesite	57.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$26.00-$27.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do. barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, tide., duty pd. ...$100-110.00
Do., del. Pitts., ..105.33-115.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot.. 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 80.50
Do., 75 per cent..... 126.00
Spot, $5 a ton higher.

Silicomanganese, 2½ c. 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $11 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 2.25

Ferrovanadium, 35 to 40%, lb., cont...2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 10.50c
Do., ton lots 11.25c
Do., less-ton lots 11.50c
67-72% carloads, 2% carbon, per lb. contained chrome 16.50c
Do., ton lots..... 17.25c
Do., less-ton lots 17.75c

	Carloads	Ton lots	Less ton
2% carb...	16.50c	17.25c	17.75c
1% carb...	17.50c	18.25c	18.75c
0.10% carb.	19.50c	20.25c	20.75c
0.20% carb.	18.50c	19.25c	19.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots... $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb..... 1.35
Do, less-ton lots..... 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls... $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill.... 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots.... 150.00
15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots. 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, any quantity, freight allowed, lb. .. 7.25c
Do, spot carlots, bulk 7.50c
Do, ton lots 8.00c
Do., less-ton lots..... 8.25c

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.75
Do, smaller lots 2.85

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 80.00c
Do, spot 85.00c
88% chrome, contract... 79.00c
Do, spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads freight allowed, ton $89.50
Carload, spot 74.50
Less-ton lots, lb. 3.75c

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots.. 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.78	4.86	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.23	3.51	4.09	8.59	7.19
Philadelphia	3.85	3.85	4.35	3.55	3.55	5.25	3.55	4.55	4.93	3.51	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	4.90	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	6.40	4.20	6.30	5.00	4.45	6.15	10.40	9.55
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.75	3.35	3.65	8.35	6.95
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.55	4.72	3.20	3.75	8.15	6.75
Detroit	3.58	3.68	3.68	3.75	3.80	5.42	3.43	4.50	4.84	3.40	3.80	8.45	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	....	4.57	3.45	4.00	8.50	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.35	4.30	4.85	3.50	3.75	8.15	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	5.00	3.83	4.34	8.84	7.44
Milwaukee	3.63	3.73	3.73	3.68	3.68	5.28	3.48	4.43	4.73	....	3.88	8.38	6.98
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	4.32	4.52	3.61	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Memphis	3.90	4.00	4.00	3.95	3.95	5.71	3.75	....	5.00	....	4.31	....	....
Chattanooga	3.80	3.90	3.90	3.85	3.85	5.80	3.65	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.54	4.54	4.33	4.33	5.93	4.24	....	5.19	....	4.69	....	....
Birmingham	3.50	3.60	3.60	3.55	3.55	5.88	3.35	....	4.85	....	4.43	....	....
New Orleans	3.85	4.65	4.65	3.80	3.80	5.75	4.10	....	4.60	5.00	5.10	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
*Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.65	6.35	4.00	4.00	6.40	3.75	6.40	5.15	....	6.15	10.65	9.80
San Francisco	4.00	4.35	6.00	4.00	4.00	5.60	3.75	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.35	5.95	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.63	4.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.78	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 pounds in Boston; 500-1499 pounds in Buffalo; 1000-1999 pounds in Philadelphia, Baltimore; 300-4999 pounds in San Francisco and Portland; any quantity in Twin Cities.

Galvanized Sheets: Base, 0-1499 pounds in New York, Tulsa; 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 pounds in Los Angeles; 300-4999 pounds in Portland, San Francisco; 450-3749 pounds in Boston; 500-1499 pounds in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis; 1500 pounds and over in Chattanooga, Philadelphia; any quantity in Twin Cities; 750-1500 pounds in Kansas City.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco; 1000 pounds and over on alloy.

SAE Hot Rolled Alloy Bars: Base, 1000 or 2000 pounds and over, except 0-4999 pounds in San Francisco; 0-1999 in Portland.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, Nov. 2

Export Prices f. o. b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$20.05 5 0 0	$18.32	2 3 0
Basic bessemer	....	19.59	2 6 0
Hematite, Phos. .03-.05	21.05 5 5 0	.....	.....
Billets	$29.57 7 7 6	$38.34	4 10 0
Wire rods, No. 5 gage	45.61 11 7 6	46.86	5 10 0
Standard rails	$38.09 9 10 0	$48.99	5 15 0
Merchant bars	1.97c 11 0 0	2.50c	6 11 6
Structural shapes	1.79c 10 0 0	2.42c	6 7 6
Plates, †¼ in. or 5 mm.	1.96c 10 18 9	2.96c	7 16 0
Sheets, black, 24 gage or 0.5 mm.	2.33c 13 0 0	3.28c	8 12 6°
Sheets, gal., 24 ga., corr.	2.82c 15 15 0	5.23c	13 15 0
Bands and strips	2.19c 12 5 0	2.35c to 2.50c	6 3 6 to 6 11 6
Plain wire, base	3.49c 19 10 0	3.04c	8 0 0
Galvanized wire, base	4.16c 23 5 0	3.61c to 3.66c	9 10 0 to 9 12 6
Wire nails, base	....	3.52c	9 5 0
Tin plate, box 108 lbs.	$5.61 1 8 0	.....	.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d	French Francs		Belgian Francs		Reich §§Mark
Fdy. pig iron, Si. 2.5	$19.85 4 19 0(a)	$15.50	679.30	$25.05	750	$25.20 63
Basic bess. pig iron	18.55 4 12 6(a)	.....	.....	.....	...	27.80 (b)69.50
Furnace coke	4.61 1 4 2	5.13	225	6.75	202	7.60 19
Billets	29.57 7 7 6	23.46	1,029	28.72	860	38.60 96.50
Standard rails	1.70c 9 10 0	1.41c	1,405	2.05c	1,375	2.38c 132
Merchant bars	2.08c 11 12 0††	1.30c	1,304	1.65c	1,100	1.98c 110
Structural shapes	1.86c 10 8 0††	1.27c	1,268	1.65c	1,100	1.93c 107
Plates, †¼-in. or 5 mm.	1.96c 10 19 3††	1.65c	1,650	2.05c	1,375	2.29c 127
Sheets, black	2.64c 14 15 0§	1.96c	1,958‡	2.36c	1,575‡	2.59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.09c 17 5 0	2.85c	2,850	4.05c	2,700	6.66c 370
Plain wire	3.49c 19 10 0	2.00c	2,000	2.48c	1,650	3.11c 173
Bands and strips	2.21c 12 7 0††	1.44c	1,444	1.95c	1,300	2.29c 127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	17.00
Bos. dock No. 1 exp.	18.25-18.75
New Eng. del. No. 1	18.00-19.00
Buffalo, No. 1	21.00-21.50
Buffalo, No. 2	19.00-19.50
Chicago, No. 1	18.50-19.00
Chicago, auto, no alloy	17.00-17.50
Chicago, No. 2 auto	15.50-16.00
Cincinnati dealers	16.00-16.50
Cleveland, No. 1	19.00-19.50
Cleveland, No. 2	17.50-18.00
Detroit, No. 1	†16.00-16.50
Detroit, No. 2	†15.00-15.50
Eastern Pa., No. 1	21.00-21.50
Eastern Pa., No. 2	20.00-20.50
Federal, Ill.	15.50-16.00
Granite City, R. R.	16.50-17.00
Granite City, No. 2	15.50-16.00
Los Angeles, No. 1	14.50-15.00
Los Angeles, No. 2	13.50-14.00
L. A., No. 1 f.a.s.	16.00-17.00
L. A., No. 2 f.a.s.	15.00-16.00
N. Y. dock No. 1 exp.	17.50
Pitts., No. 1 (R. R.)	24.50-25.00
Pittsburgh, No. 1	22.50-23.00
Pittsburgh, No. 2	21.00-21.50
St. Louis, R. R.	18.00-18.50
St. Louis, No. 2	15.50-16.00
San Francisco, No. 1	15.50-16.00
San Francisco, No. 2	14.50-15.00
Seattle, No. 1	14.50-15.50
Toronto, dirs., No. 1	11.25
Valleys, No. 1	20.50-21.00

COMPRESSED SHEETS

Buffalo, new	19.00-19.50
Chicago, factory	18.00-18.50
Chicago, dealers	16.25-16.75
Cincinnati, dealers	15.50-16.00
Cleveland	18.50-19.00
Detroit	†17.50-18.00
E. Pa., new mat.	21.00-21.50
E. Pa., old mat.	18.50-19.00
Los Angeles	12.00-12.50
Pittsburgh	22.50-23.00
St. Louis	13.50-14.00
San Francisco	14.00-14.50
Valleys	20.00-20.50

BUNDLED SHEETS

Buffalo, No. 1	19.00-19.50
Buffalo, No. 2	16.50-17.00
Cleveland	14.50-15.00
Pittsburgh	21.00-21.50
St. Louis	12.00-12.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	14.00-14.50
Cincinnati dealers	11.00-11.50
Detroit	†12.50-13.00
St. Louis	10.50-11.00
Toronto, dealers	6.50

BUSHELING

Buffalo, No. 1	19.00-19.50
Chicago, No. 1	17.00-17.50
Cincin., No. 1, deal.	12.00-12.50
Cincinnati, No. 2	5.00- 5.50
Cleveland, No. 2	12.50-13.00
Detroit, No. 1, new	†15.50-16.00
Valleys, new, No. 1	19.50-20.00
Toronto, dealers	5.00- 5.50

MACHINE TURNINGS (Long)

Birmingham	7.50
Buffalo	13.00-13.50
Chicago	11.00-11.50
Cincinnati, dealers	7.00- 7.50
Cleveland, no alloy	11.50-12.00
Detroit	†9.50-10.00
Eastern Pa.	14.00-14.50
Los Angeles	4.00- 5.00
New York	†8.00- 8.50
Pittsburgh	15.00-15.50
St. Louis	7.00- 7.50
San Francisco	5.00
Toronto, dealers	5.50- 6.00
Valleys	12.50-13.00

SHOVELING TURNINGS

Buffalo	15.00-15.50
Cleveland	12.50-13.00
Chicago	11.00-11.50
Chicago, spcl, anal.	12.50-13.00
Detroit	†12.00-12.50
Pitts., alloy-free	17.50-18.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†6.75- 7.50
Buffalo	11.50-12.00
Cincinnati, dealers	6.00- 6.50
Cleveland	12.00-13.00
Eastern Pa.	12.50-13.00
Detroit	†9.50-10.00
New York	†8.00- 8.50
Pittsburgh	14.00-14.50
Toronto, dealers	5.50- 6.00

AXLE TURNINGS

Buffalo	17.50-18.00
Boston district	†10.50-11.00
Chicago, elec. fur.	19.00-19.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	13.50-14.00
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.00- 7.50
Boston dist. chem.	†9.00- 9.50
Buffalo	11.50-12.00
Chicago	10.50-11.00
Cincinnati, dealers	6.00- 6.50
Cleveland	12.00-13.00
Detroit	†9.50-10.00
E. Pa., chemical	14.50-15.00
New York	†8.00- 8.50
St. Louis	7.00- 7.50
Toronto, dealers	5.00- 5.50

RAILROAD SPECIALTIES

Chicago	21.50-22.00

ANGLE BARS—STEEL

Chicago	21.00-21.50
St. Louis	21.00-22.00

SPRINGS

Buffalo	23.50-24.00
Chicago, coil	22.00-22.50
Chicago, leaf	21.00-21.50
Eastern Pa.	26.00-26.50
Pittsburgh	27.50-28.00
St. Louis	21.00-21.50

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	23.50-24.00
Chicago (3 ft.)	21.50-22.00
Chicago (2 ft.)	22.00-22.50
Cincinnati, dealers	23.00-23.50
Detroit	†24.50-25.00
Pitts., 3 ft. and less	27.50-28.00
St. Louis, 2 ft. & less	21.50-22.00

STEEL RAILS, SCRAP

Boston district	†15.50-16.00
Buffalo	21.00-21.50
Chicago	18.50-19.00
Cleveland	22.00-22.50
Pittsburgh	24.50-25.00
St. Louis	18.00-18.50
Seattle	18.00-18.50

FROGS, SWITCHES

Chicago	18.50-19.00
St. Louis, cut	18.00-18.50

ARCH BARS, TRANSOMS

St. Louis	20.00-20.50

PIPE AND FLUES

Chicago, net	13.50-14.00
Cincinnati, dealers	12.50-13.00

RAILROAD GRATE BARS

Buffalo	14.00-14.50
Chicago, net	12.00-12.50
Cincinnati, dealers	9.50-10.00
Eastern Pa.	18.00-18.50
New York	†13.00-13.50
St. Louis	13.00-13.50

RAILROAD WROUGHT

Birmingham	11.00-11.50
Boston district	†9.50-10.00
Eastern Pa., No. 1	21.50-22.00
St. Louis, No. 1	12.50-13.00
St. Louis, No. 2	16.50-17.00

FORGE FLASHINGS

Boston district	†12.25-12.75
Buffalo	19.00-19.50
Cleveland	17.50-18.00
Detroit	†14.50-15.00
Pittsburgh	21.00-21.50

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	22.00-22.50

LOW PHOSPHORUS

Cleveland, crops	23.50-24.00
Eastern Pa., crops	25.50-26.00
Pitts., billet, bloom, slab crops	29.00-29.50

LOW PHOS. PUNCHINGS

Buffalo	22.00-22.50
Chicago	21.00-21.50
Cleveland	22.00-22.50
Eastern Pa.	26.00-26.50
Pittsburgh	25.50-26.00
Seattle	15.00
Detroit	†17.50-18.00

RAILS FOR ROLLING
5 feet and over

Birmingham	20.00
Boston	†17.00-17.50
Chicago	21.00-21.50
New York	†18.00-18.50
Eastern Pa.	24.00-24.50
St. Louis	20.00-20.50

STEEL CAR AXLES

Birmingham	20.00-21.00
Boston district	†18.50-19.00
Chicago, net	22.00-22.50
Eastern Pa.	25.00-25.50
St. Louis	22.00-22.50

LOCOMOTIVE TIRES

Chicago (cut)	21.00-21.50
St. Louis, No. 1	17.50-18.00

SHAFTING

Boston district	†18.75-19.00
New York	†18.00-18.50
Eastern Pa.	24.50-25.00
St. Louis, 1¼-3¾".	19.50-20.00

CAR WHEELS

Birmingham	13.50-14.00
Boston dist., iron	†15.00-15.50
Buffalo, steel	23.50-24.00
Chicago, iron	18.50-19.00
Chicago, rolled steel	20.50-21.00
Cincin., iron, deal.	18.50-19.00
Eastern Pa., iron	22.50-23.00
Eastern Pa., steel	25.50-26.00
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	27.00-27.50
St. Louis, iron	20.00-20.50
St. Louis, steel	21.00-21.50

NO. 1 CAST SCRAP

Birmingham	13.00-13.50
Boston, No. 1 mach.	†16.50-17.00
N. Eng. del. No. 2	17.00-17.50
N. Eng. del. textile	20.00-25.00
Buffalo, cupola	19.00-19.50
Buffalo, mach.	20.00-20.50
Chicago, agri. net	14.00-14.50
Chicago, auto net	15.50-16.00
Chicago, railroad net	15.00-15.50
Chicago, mach. net	15.50-16.00
Cincin., mach. deal.	19.00-19.50
Cleveland, mach.	20.00-21.00
Detroit, cupola, net	†16.50-17.00
Eastern Pa., cupola	22.00-23.00
E. Pa., mixed yard	19.00-19.50
Los Angeles, net	15.00-16.50
Pittsburgh cupola	22.50-23.00
San Francisco, del.	12.50-13.00
Seattle	16.00-16.50
St. Louis, cupola	15.00-15.50
St. Louis agri. mach.	18.00-18.50
St. L., No. 1 mach.	19.00-19.50
San Francisco	14.50-15.00
Toronto, No. 1, mach., net, dealers	16.00-16.50

HEAVY CAST

Boston dist. break.	†14.75-15.00
New England, del.	16.00-17.00
Buffalo, break	16.50-17.00
Cleveland, break, net	15.25-15.75
Detroit, auto net	†17.50-18.00
Detroit, break.	†14.50-15.00
Eastern Pa.	20.00-20.50
Los Ang., auto, net.	14.50
New York, break	†16.00-16.50
Pittsburgh, break	18.50-19.00

STOVE PLATE

Birmingham	9.00-10.00
Boston district	†14.00-14.50
Buffalo	15.00-15.50
Chicago, net	12.00-12.50
Cincinnati, dealers	10.25-10.75
Detroit, net	†11.00-11.50
Eastern Pa.	18.00-18.50
New York, fdy.	13.00-13.50
St. Louis	12.00-12.50
Toronto dealers, net	11.00-11.50

MALLEABLE

Birmingham, R. R.	14.00-15.00
New England, del.	11.50-12.50
Buffalo	21.50-22.00
Chicago, R. R.	21.00-21.50
Cincin., agri., deal.	15.50-16.00
Cleveland, rail	23.00-23.50
Eastern Pa., R. R.	21.50-22.00
Los Angeles	12.50
Pittsburgh, rail	23.50-24.00
St. Louis, R. R.	17.00-17.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit, c.i.f. Atlantic

Manganiferous ore, 45-55% Fe., 6-10% Mn	14.00-15.00
North African low phos.	14.00
Spanish, No. African basic, 50 to 60%	14.00
Chinese wolframite, short ton unit, duty paid	$23.75-25.00
Scheelite, imp.	$25.00-26.00
Newfoundland fdry. 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$25.00-26.00

Manganese Ore

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52%	48.50-50.00c
So. African, 50-52%	48.50-50.00c
Indian, 49-50%	nom.
Brazilian, 43-45%	nom.

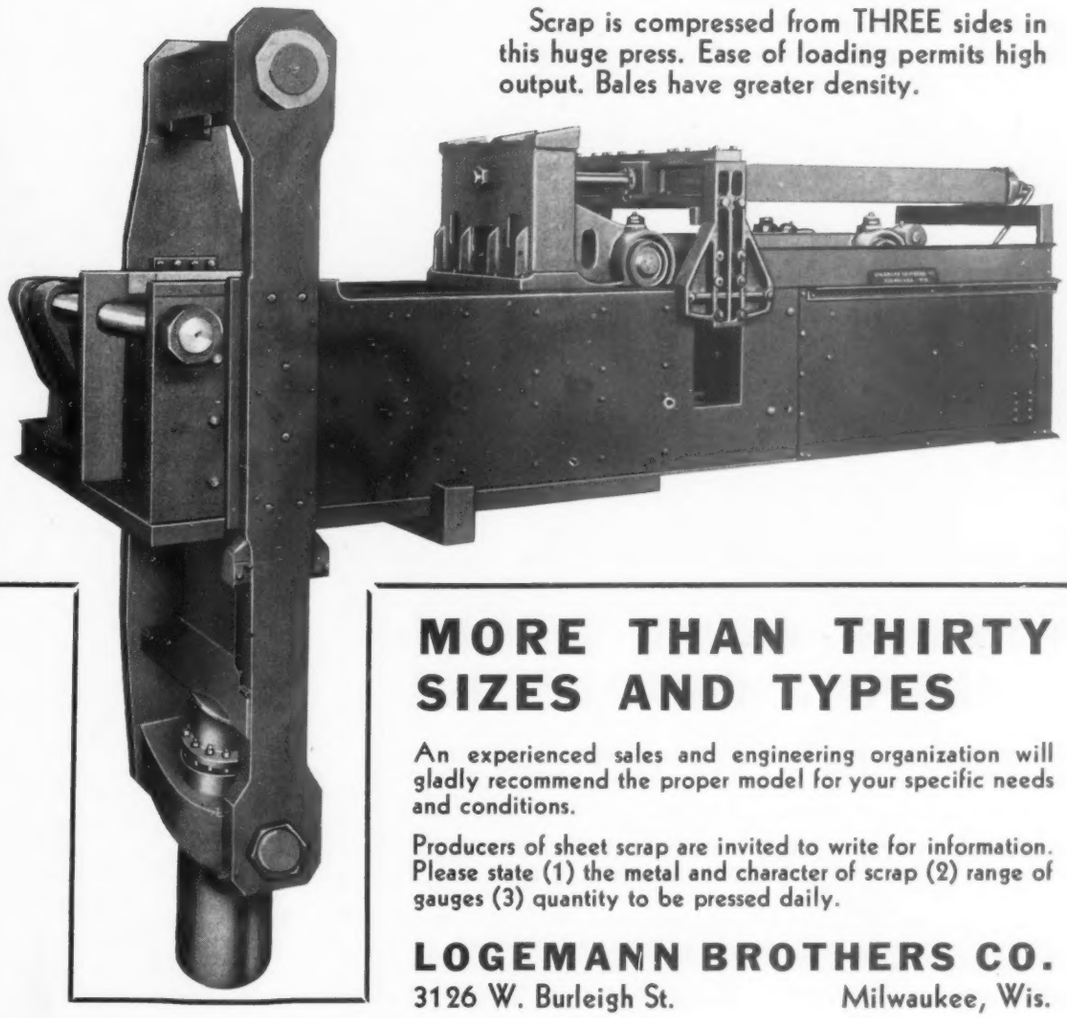
Molybdenum

Sulphide concentrates, per lb. Mo. contained, mines	$0.75

LOGEMANN

SCRAP PRESSES

POWERFUL RUGGED RELIABLE



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Producers of sheet scrap are invited to write for information. Please state (1) the metal and character of scrap (2) range of gauges (3) quantity to be pressed daily.

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Baling Presses . . . Pumps . . . Straighteners . . . Accumulators . . . Valves

Sheets, Strip

Sheet & Strip Prices, Pages 82, 83

Pittsburgh—Production is moving up slowly, although most sheet mills are at capacity, with the average better than 80 per cent. Galvanized sheet operations are at 79 and strip mills around 75. Orders continue to accumulate, substantial tonnages being at hand for first quarter delivery. No word is available on first quarter prices, although it is taken for granted there will be adjustments on some of the coated materials to compensate for increased cost of the coatings.

Cleveland — Substantial backlogs are being accumulated for January shipment in some grades. Deliveries vary, being more extended on hot-rolled than on cold-rolled material. Gains in consumption the past few weeks appear to be absorbing most of the upturn in shipments in the same period.

Chicago — A substantial buying movement for first quarter delivery has developed in sheets and strip. This is attributed partly to expectations of no large price increase early next year. Automotive needs, while large, are curtailed by labor trouble. Demand from farm equipment builders is heavy.

Boston—Operating at capacity, narrow cold strip producers are booking more volume for next quarter delivery at open prices. Consumption is heavier and most shipments are going into work rather than inventories. This is reflected by continued pressure for deliveries.

New York—Volume is lighter but producers find their schedules extended well into next quarter. Household equipment makers are specifying more heavily than was expected. This demand appears to have passed its peak in most lines, but some manufacturers are pressing for tonnage to complete stocks for the holidays.

Heavier consumption of narrow cold strip maintains pressure for deliveries and apparently little tonnage now being shipped is going into stocks. More first quarter open price volume is being booked.

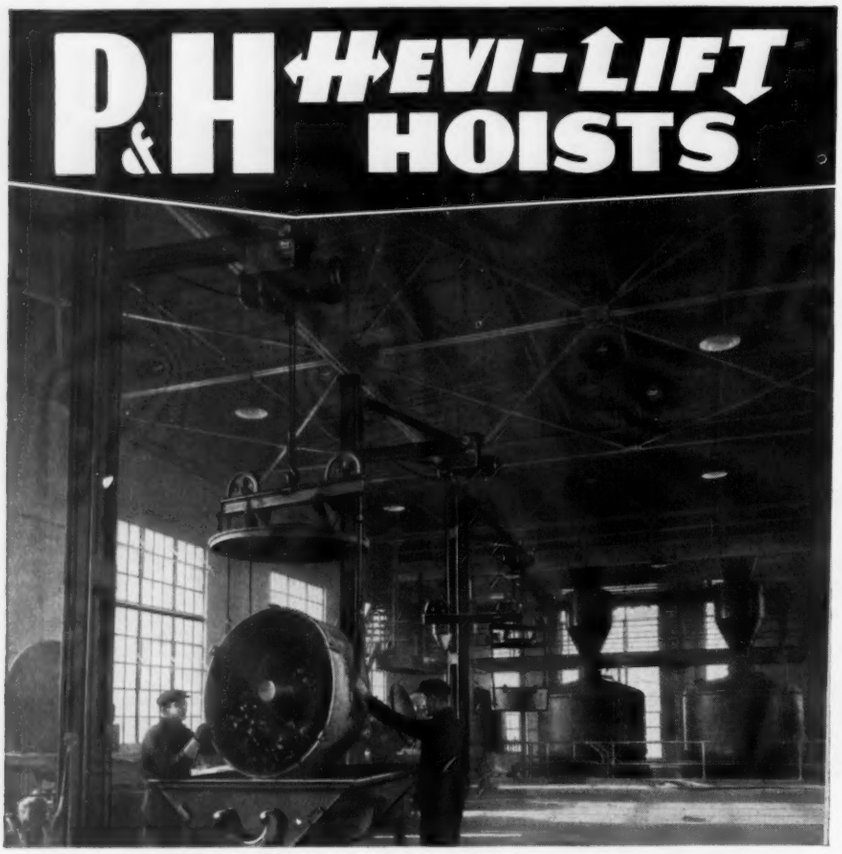
Philadelphia—A movement is reported under way to revise prices of sheets rolled on continuous mills and finished on cold mills but sold at hot-rolled prices. Under the proposed setup, understood to be followed now by some mills, 18 gage and heavier hot-rolled pickled sheets would take the hot-rolled sheet base plus a $4 pickling extra; 19-23 gage would receive a cold finishing pass and would be sold at the hot-rolled price plus pickling extras of $4 in 19-20 gages, $5 in 21-22 gages and $8 in 23 gage; 24 gage and lighter would take the cold-rolled mill run base. Only a few mills still can give fairly early delivery on small lots of new business.

Buffalo—First quarter bookings are increasing as some consumers find they are unable to acquire all the tonnage asked for the ensuing two months. Heavy production appears assured at least through early 1940.

Cincinnati — Production has been expanded as much as possible, mills attempting to clear books of all fourth quarter business by the end of the year. First quarter bookings are increasing, and some export orders have been taken lately at a premium.

St. Louis — Liberal bookings of sheets and strip for first quarter delivery continue, despite absence of price announcement. Ordering of certain grades by warehouse and jobbing interests is more in evidence than heretofore.

Birmingham, Ala. — Sheets continue one of the most active products



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Faster—At Lower Cost

Whether it's steel or cotton—whether it's moved a few feet or many feet—electric power with P&H Hoists will cost you less than man-power. P&H Engineers will gladly show you how "thru the air" handling can help you get more production from the equipment you already have. Your request for advice carries no obligation. Write us. The Harnischfeger Corporation, 4411 W. National Avenue, Milwaukee, Wis.

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with much of the output going directly into consumer hands, although there is some restocking by jobbers and distributors. Production is over 90 per cent of actual capacity, and there is some backlog on the books.

Plates

Plate Prices, Page 82

Boston—Plate deliveries slightly under four weeks are possible by a few eastern mills at 2.35c base. Recent slight improvement in buying is maintained by small orders from a greater number of consumers rather than heavy individual tonnages, and specified work continues light. Shipyard specifications account for most shipments.

New York — Plate specifications are heavy, particularly from railroads and shipyards. Oil company demand still lags, although considerable work is in tentative stages. About 5400 tons of steel will be required for hull and superstructure for two C-1 boats placed by the maritime commission with Pusey & Jones Corp., Wilmington, Del. Thirty-eight boats of this type have been placed since July 11. Export plate prices are unchanged.

Philadelphia—A railroad inquiry for several thousand light gage plates for cars brought out prices of 2.10c, 2.35c and 2.40c, base, with the highest price quoted for fairly early delivery. Backlogs are growing, but some producers still are able to take orders for delivery in three to four weeks.

Birmingham, Ala.—Due to a large volume of business from the Pullman car plant at Bessemer, requirements for shipbuilding, and orders from plant manufacturers, plates are consistently active. Mills have considerable accumulation of tonnage, although deliveries are being met.

San Francisco — Bids have just been opened by the Pacific Gas & Electric Co. for 300 tons of plates for nine smokestacks for its new plant at Avon, Calif. Awards totaled only 240 tons, bringing the year's aggregate to 89,546 tons, compared with 37,292 tons for the same period a year ago.

Plate Contracts Placed

2410 tons, 14 coal barges, Wheeling Steel Corp., to Dravo Corp., Pittsburgh.

1650 tons, 10 tanks, Gulf Oil Corp., Port Arthur, Tex., to Petroleum Iron Works Co., Sharon, Pa.

1440 tons, six oil barges, Socony-Vacuum Oil Co., St. Louis, to American Bridge Co., Pittsburgh.

1145 tons, armor plate, bureau of ordnance, navy department, to Carnegie-Illinois Steel Corp., Washington, $375 to $415 per ton under four classes, only bidder, pro. 228; bids Oct. 24, Washington.

310 tons, large-diameter steel water mains, Thirtieth and Fortieth streets, New York, to Alco Products Inc., Dunkirk, N. Y.; Oakhill Contracting Co., Bronx, N. Y., contractor.

260 tons, tunnel interlining, contract 306, White Plains, N. Y., to Alco Products Inc., Dunkirk, N. Y.

Plate Contracts Pending

300 tons, nine smokestacks for Pacific Gas & Electric Co., Avon, Calif.; bids opened.

100 tons, 86 welded steel pontoons, Port of Portland, Portland, Oreg.; Steel Tank & Pipe Co., Portland, Oreg., low.

Bars

Bar Prices, Page 82

Chicago—Production continues at virtual capacity, with most mills unable to take more bookings for this quarter. Certain sizes, especially in alloy bars, are reported still available at one mill.

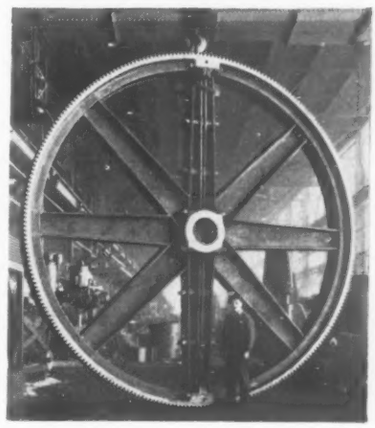
Boston—Orders for shipment next

BIG GEARS and LITTLE ONES

Farrel-Sykes Gears Made in Any Size

Whether large or small gears are required Farrel-Sykes Continuous Tooth Herringbone Gears are made in a complete range of sizes to meet all needs. They can be supplied in any size up to 22 feet in diameter and for any power capacity.

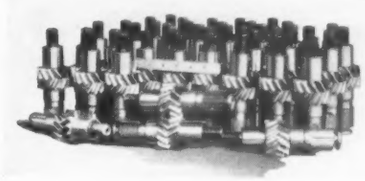
Throughout their entire size range Farrel-Sykes Gears are *engineered* to the job they have to do — their continuous herringbone teeth give them extra strength and load-carrying capacity to withstand shocks, stresses and wear. The combined characteristics of gradual engagement of the teeth, overlapping or interlacing of the teeth and inclined line of pressure, plus precision generation by the Sykes process, make these gears exceptionally quiet and smooth-running and increase their durability. The result is continuous high operating efficiency, minimum maintenance cost and long life.



Farrel-Sykes Continuous Tooth Herringbone Gear for rolling mill drive, 217.480" outside diameter, 25" face. Transmits 800 H.P. at 360 RPM. Ratio of gear and pinion 18.12 to 1, speed of gear 19.85 RPM, peripheral velocity 1130 feet per minute. Total weight 44,900 pounds. Made of steel castings in two halves carefully machined and bolted together with fitted bolts.

Farrel engineers are available for consultation on gear applications. Their experience in solving many unusual drive problems may help with yours.

We also manufacture straight tooth and single helical gears in any size from ¼" to 22'0" diameter and are specially equipped to produce internal gears with either spur or helical teeth in any size up to 18 ft. diameter.



(*Left*)—Small Sykes Gears integral with shafts 8 3/16" long overall, 12 teeth, 6 DP, 1 3/8" face 2.413" outside diameter. The greatest strength for the space available is obtained with these gears.

FARREL SYKES GEARS

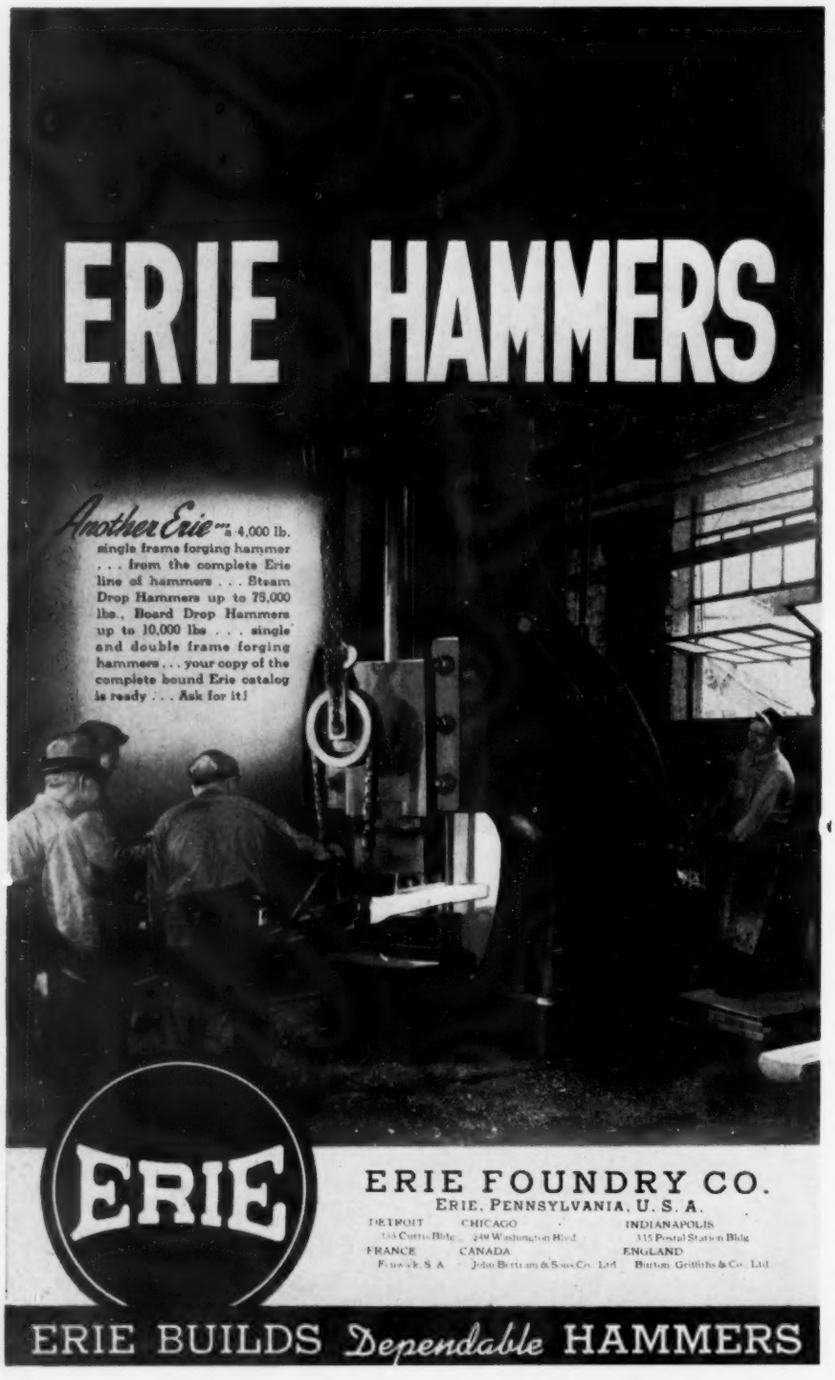
FARREL-BIRMINGHAM COMPANY, INC.
322 VULCAN STREET - - - - BUFFALO, N. Y.
The Gear with a Backbone

quarter are being placed by some distributors and consumers, but volume is curtailed by difficulty in securing delivery the next two months. However, warehouse stocks are better balanced, thereby accommodating small-lot consumers. Demand for alloys is brisk, with machine tool shop requirements substantial. Shipyard and railroad specifications are steady.

Philadelphia—Few producers are able to accept additional fourth quarter business, and considerable tonnage now on books is for January delivery. Consumption continues to expand, with small tool makers at 75 to 80 per cent and bolt and nut plants at 80. The latter are especially busy on railroad requirements.

Birmingham, Ala. — Bars, especially for concrete reinforcing, continue in good demand and considerable tonnage is moving. Merchant bar demand also holds up well and mill are comfortably booked with some extension in deliveries.

Buffalo — Bar output is at the best level possible, but it is doubtful whether consumers are covered to the extent many had anticipated. As a result, bookings for first quarter are increasing.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Pipe

Pipe Prices, Page 83

Pittsburgh—Gulf Oil Corp. has awarded a 450-mile gasoline pipe line to National Tube Co. The line, to be laid from Port St. Joe, Fla., to Atlanta, Ga., will involve 23,000 to 25,000 tons of 6⅝ and 8⅝-inch seamless steel pipe.

Boston—Merchant pipe buying is mostly in small lots through secondary sellers. Cast pipe demand has slackened, but releases are still fair. Wrought pipe volume is small. Mechanical tubing, however, is more active.

New York — Merchant pipe mill prices are unchanged, but local resale prices are as unsettled as at any time this year. Producers are still able to make deliveries this year, due to substantial stocks.

While cast pipe activity has declined, due in part to less utility buying, miscellaneous purchases are substantial for this period. United States Pipe & Foundry Co. booked close to 1500 tons for Panama. Export inquiries are numerous, notably from South America, and considerable business is being taken at premium prices.

San Francisco — Activity in cast iron pipe has fallen off somewhat and few new inquiries have come out. Only three projects, calling for 100 tons or more are now pending.

Cast Pipe Pending

200 tons, Sunnyside, Wash., improvement; A. M. DeBlasio, Yakima, Wash., low.

100 tons, Sand Point Way improvement, Seattle; N. Coluccio & Co., Seattle, low.

Wire

Wire Prices, Page 83

Cleveland—Wire rod capacity is sold out for the remainder of the quarter, but business can be filled in some wire items, depending on grade and size involved. Distributors of wire products report inventory additions at least partially offset by gains in their business.

Chicago—First quarter orders for wire and wire products are relatively light. Producers have attempted to postpone accepting first quarter orders until new prices are announced. Present demand is well scattered.

Boston—Additional first quarter business is being booked. Manufacturers' wire is outstanding in diversified demand. Scheduling of orders remains a problem, but less

confusion is apparent. Little rod tonnage is available from integrated producers.

New York—With more volume being booked for first quarter, wire mills are still confronted by production problems in striving to ship material taken at present quotations before Dec. 31. Business ranges from rope to hairpin wire and includes hundreds of specialties. There is a shortage of wire rods and also billets for the production of rods in some instances.

Birmingham, Ala. — Wire demand continues to increase, with particular activity in merchant markets. Production is somewhat above 90 per cent.

Rails, Cars

Track Material Prices, Page 83

Placing of 19,634 freight cars in October failed to equal September, when 23,000 units were ordered. Total for 10 months is 55,090, compared with 12,490 in the same period last year, 51,061 in ten months of 1937 and 39,523 in the 1936 period.

Among recent large car orders is 1100 for Delaware, Lackawanna & Western, which also closed for 5000 tons of rails last week. New York Central's rail purchase has been delayed but it is believed action will be taken this week on 50,000 tons of rails and 5000 tons of fastenings. Comparisons follow:

	1939	1938	1937	1936
Jan.	3	25	17,806	2,050
Feb.	2,259	109	4,972	6,900
March	800	680	8,155	632
April	3,095	15	9.772	4,427
May	2,051	6,014	4,732	8,900
June	1,324	1,178	548	5,200
July	110	0	1,030	7,229
Aug.	2,814	182	1,475	225
Sept.	23,000	1,750	1,216	1,750
Oct.	19,634	2,537	1,355	2,210
10 mos.	55,090	12,490	51,061	39,523
Nov.	.....	1,232	275	1,550
Dec.	.....	2,581	275	23,450
Total	.....	16,303	51,611	64,523

Car Orders Placed

Baltimore & Ohio, 500 box cars, to Pressed Steel Car Co., Pittsburgh; in addition to 1500 noted in last week's issue.

Bessemer & Lake Erie, 2050; 1000 ninety-ton hoppers to Pullman-Standard Car Mfg. Co., Chicago, 500 fifty-ton gondolas to Pressed Steel Car Co., Pittsburgh, 500 fifty-ton box cars to Greenville Steel Car Co., Greenville, Pa., and 50 covered hoppers to American Car & Foundry Co., New York.

Canadian National, 3265; 1100 box and 500 flat to Canadian Car & Foundry Co., Montreal, 1075 box cars to Eastern Car Co., New Glasgow, N. S., 590 box cars to National Steel Car Co., Hamilton, Ont.

Canadian Pacific, 1300; 500 box and 200 refrigerator cars to National Steel Car Co., Hamilton, Ont., 500 box and 100 auto cars to Canadian Car & Foundry Co., Montreal; in addition, 10 mail and express cars have been awarded to National.

Delaware, Lackawanna & Western, 1100 cars; 500 fifty-ton box, 500 fifty-ton hoppers, 100 seventy-ton gondolas, to American Car & Foundry Co., New York; light-weight, high-tensile steel.

Elgin, Joliet & Eastern, 2050 cars; 600 hoppers to American Car & Foundry Co., New York, 300 hoppers to Ralston Steel Car Co., Columbus, O., 300 hoppers to General American Transportation Co., Chicago, 300 hoppers to Pullman-Standard Car Mfg. Co., Chicago, 50 covered hoppers to American Car & Foundry Co. and 500 gondolas to Mount Vernon Car Mfg. Co., Mount Vernon, Ill.

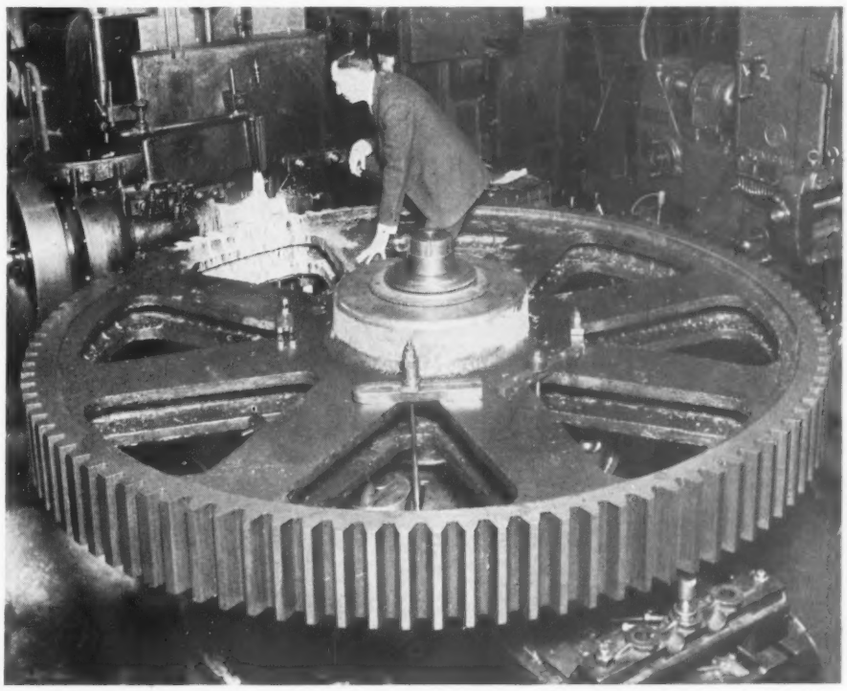
Inland Steel Co., 50 seventy-ton mill-type gondolas to General American Transportation Co., Chicago.

Louisiana & Arkansas, 100 fifty-ton steel box cars, to American Car & Foundry Co., New York, in addition to 200 recently placed with same builder.

Navy, 17 flat cars, to Haffner-Thrall Car Co., Chicago.

Northern Pacific, 500 gondolas to Pressed Steel Car Co., Pittsburgh, 50 hoppers to General American Tank Car Co., Chicago; in addition to 1400 reported last week.

Texas & Pacific, 500 fifty-ton steel



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☆ Whether you need gears that weigh thousands of pounds like the one illustrated above or any size down to a few ounces, you will find that Horsburgh & Scott quality speaks louder than words. It's performance . . . not promises that wins reorders for Horsburgh & Scott gears. With a complete line of all types and sizes . . . here's one source for all gears and gear products.

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GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

sheathed box cars, to Mount Vernon Car Mfg. Co., Mount Vernon, Ill.

Utah Copper Co., 100 cars to Pressed Steel Car Co., Pittsburgh, in addition to 100 recently awarded same builder.

Car Orders Pending

Atchison, Topeka & Santa Fe, 27 eighty-ton ore cars; bids asked.

Lake Terminal railway, 100 to 200 seventy-ton gondolas; bids asked.

Rail Orders Placed

Chicago, Rock Island & Pacific, 16,000 tons to Carnegie-Illinois Steel Corp., Chicago, in addition to 12,000 tons placed in September.

Delaware, Lackawanna & Western, 5000 tons; 4000 tons to Bethlehem Steel Co., Bethlehem, Pa., 1000 tons to Carnegie-Illinois Steel Corp., Pittsburgh.

Municipal railway, San Francisco, 1375 tons, to Columbia Steel Co., San Francisco.

Wabash, 10,000 tons, equally divided between Bethlehem Steel Co., Bethlehem, Pa., and Carnegie-Illinois Steel Corp., Pittsburgh.

Locomotives Placed

Canadian Pacific, 24 locomotives, 12 each to Montreal Locomotive Works, Montreal, and Canadian Locomotive Works, Kingston, Ont.

Canadian National, 25 locomotives to Montreal Locomotive Works, Montreal, and 10 to Canadian Locomotive Works, Kingston, Ont.

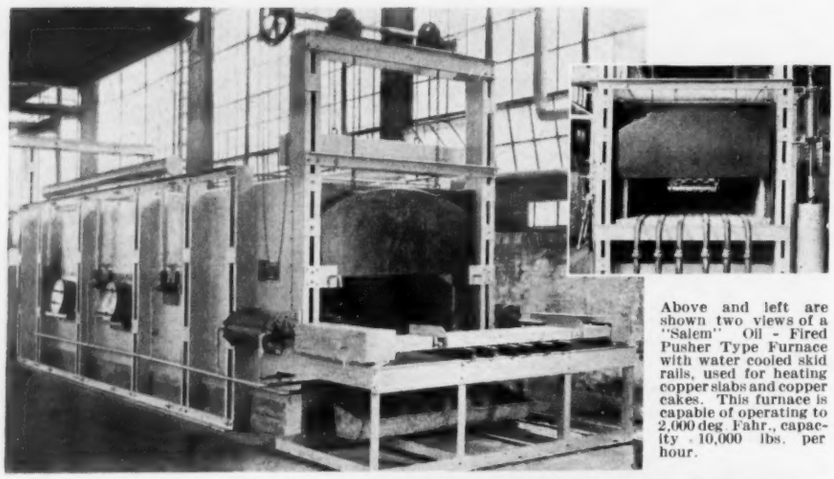
Ford Motor Co., three diesel electric switch engines, to General Electric Co., Schenectady, N. Y., each to be equipped with 500-horsepower Cooper-Bessemer Corp. diesel engines.

Locomotives Pending

Army, chief of engineers, 57 gasoline-mechanical drive locomotives; bids closed.

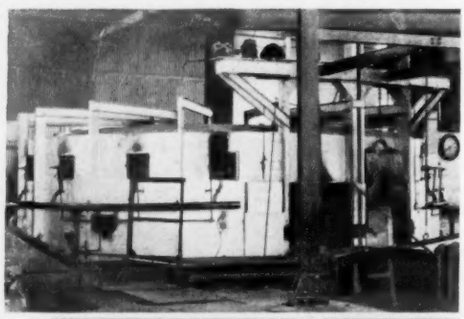
Chilean State Railway, 16 locomotives, 10 of 4-8-2 and six of 2-8-2 types.

SALEM FURNACES FOR NON-FERROUS METALS

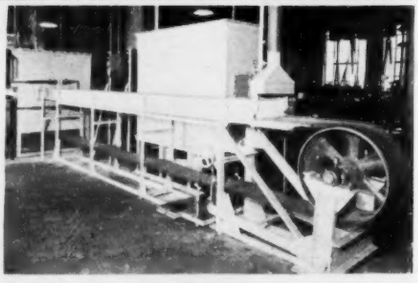


Above and left are shown two views of a "Salem" Oil - Fired Pusher Type Furnace with water cooled skid rails, used for heating copper slabs and copper cakes. This furnace is capable of operating to 2,000 deg. Fahr., capacity - 10,000 lbs. per hour.

WITH much specialized training in designing and building of non-ferrous heating and heat treating furnaces "Salem" stands ready to fill your needs. Ask us about your own requirements.



Middle illustration shows a Fuel-Fired Rotary Hearth Furnace used to heat non-ferrous billets for extrusion. This furnace is also used for heating shells. Bottom illustration at the right shows a "Salem" 40 K. W. Special Atmosphere Electric Furnace with wire mesh belt conveyor for brazing firearm components. Material is delivered from furnace in bright condition.



SALEM, OHIO

New York . . . Chicago
Detroit . . . Pittsburgh
London . . . . . Paris
Welland, Ontario

SALEM ENGINEERING COMPANY

Shapes

Structural Shape Prices, Page 82

Pittsburgh — Industrial expansions and federal programs are helping to maintain good demand for structural shapes. Mills are experiencing more difficulty in making desired deliveries, although shipments have increased with the use of additional capacity. Backlogs are fairly steady.

Cleveland—Deliveries on standard and special structural sections are improving, shipments generally being available in four to six weeks. Fabricators are handicapped in estimating some jobs by absence of first quarter price information. Awards are headed by 2800 tons for the easterly extension of the Main avenue bridge here. Pending work includes 2000 tons of piling for Cuyahoga river straightening.

Boston—Demand is light, although inquiries for small lots are more numerous. Outstanding is 800 tons for a naval assembly shop, Newport, R. I.

New York — Award of 2500 tons for a New York Central railroad viaduct here, is outstanding. Inquiry is light, but more small and medium sized industrial extensions feature such business. Two local schools take 4650 tons.

American Institute of Steel Construction, New York, reports estimated structural bookings for September at 118,020 tons, compared

Shape Awards Compared

	Tons
Week ended Nov. 4.....	27,360
Week ended Oct. 28.....	17,827
Week ended Oct. 21.....	24,104
This week, 1938	40,320
Weekly average, year, 1938.	21,568
Weekly average, 1939.....	22,723
Weekly average, October. .	21,730
Tota lto date, 1938.....	898,194
Total to date, 1939.....	999,804

Includes awards of 100 tons or more.

with 94,314 tons in August and 92,469 for September, 1938. Nine months' bookings this year, 988,575 tons, compared with 785,354 tons for the same period in 1938. Shipments in September were 136,278 tons, in August 136,402 tons and in September, 1938, 93,553 tons. Nine months' shipments were 1,049,206 tons; in 1938 they were 847,402 tons.

Philadelphia — Some shape business has been booked well into first quarter against identified work at 2.10c base, which has led fabricators to believe fourth quarter prices will be extended. Mill deliveries average six weeks.

Seattle — Fabricators report a marked increase in jobs of 50 tons or less each, due to more active plant and store construction. No important projects are up for figures, shops having sufficient backlogs to carry them to January.

San Francisco—Activity in structural shapes is pronounced and 4027 tons were reported booked, bringing the aggregate for the year to 133,724 tons, compared with 132,204 tons for the corresponding period in 1938. Consolidated Steel Corp. booked 3000 tons for trestle work for the general contractors on the Friant dam, Central Valley project, California.

Shape Contracts Placed

3000 tons, trestle work for Friant dam, Central Valley project, Calif., to Consolidated Steel Corp., Los Angeles.

2800 tons, easterly extension to Main avenue bridge, Cleveland, to Bethlehem Steel Co., Bethlehem, Pa.; National Engineering & Contracting Co., Cleveland, general contractor. Carnegie-Illinois Steel Corp. expected to furnish 300 tons of piling.

2500 tons, viaduct, Eleventh avenue, New York, New York Central railroad, to American Bridge Co., Pittsburgh; Elmhurst Contracting Co., New York, contractor.

2230 tons, three Pennsylvania railroad car-float sections, New York, Dravo Corp., Pittsburgh.

1800 tons, bridges A-545 and A-243, Arizona, for Atchison, Topeka & Santa Fe railway, to Bethlehem Steel Co., Bethlehem, Pa.

1770 tons, bridges, FAP, Trinity-Walker counties, Texas; 580 tons, North Texas Iron & Steel Co., Fort Worth, Tex.; 580 tons, Austin Bros., Dallas, Tex., and 610 tons, Illinois Steel Bridge Co., Jacksonville, Ill.

1500 tons, machine shop buildings, Cincinnati, to Austin Co., Cleveland.

1400 tons, Commercial National Bank building, Shreveport, La., to Ingalls Iron Works Co., Birmingham, Ala., through James Stewart Co., New York.

940 tons, apartment building, Park avenue and Seventy-third street, New York, to Harris Structural Steel Co., New York.

900 tons, including steel sheet piling, bulkhead and wharf at Kodiak, Alaska, for navy airbase construction, to Columbia Steel Co., Seattle; Siems, Drake, Puget Sound, Seattle, general contractor.

875 tons, bridge requirements, Chicago, Burlington & Quincy railroad; 470 tons to American Bridge Co., Pittsburgh; 275 tons to Vierling Steel Works, Chicago, and 130 tons to Joseph T. Ryerson & Son Inc., Chicago.

750 laboratory structures, Langley Field, Va.; 415 tons to Belmont Iron Works, Eddystone, Pa., and 335 tons to Pittsburgh-Des Moines Steel Co., Pittsburgh.

750 tons, bridge, Atchison, Topeka & Santa Fe railroad, Thirty-first and Western avenue, Chicago, to Gage Structural Steel Co., Chicago.

610 tons, powder and ammunition magazines, Savanna, Ill., to Gage Structural Steel Co., Chicago; Manhattan Construction Co., Muskogee, Okla., contractor.

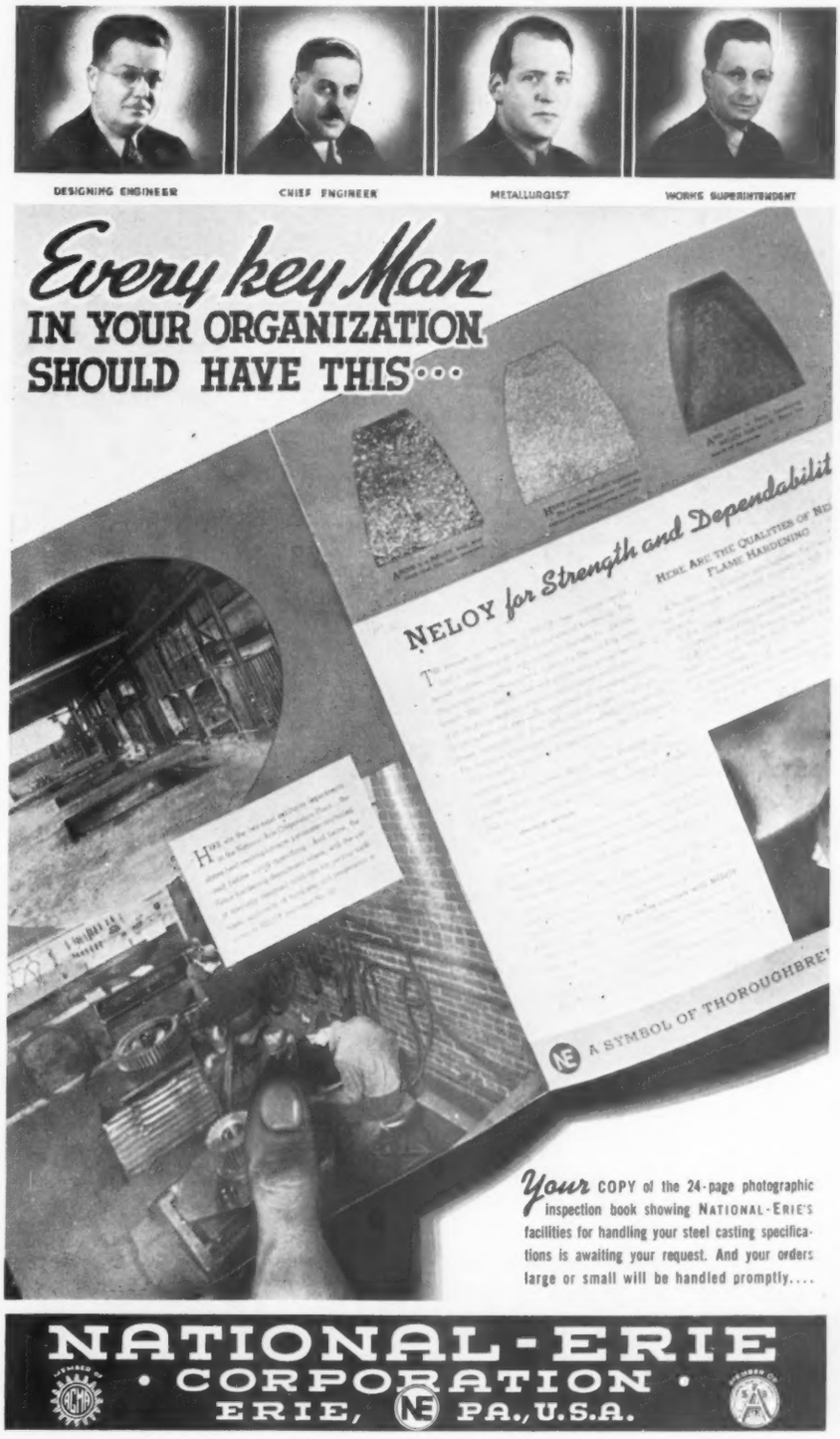
610 tons, aircraft storage buildings, Pensacola, Fla., to Ingalls Iron Works, Birmingham, Ala.

380 tons, state highway bridges, Monticello, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

370 tons, railing reconstruction, Williamsburg bridge, New York, to Vulcan Rail & Construction Co., Queens, N. Y.

350 tons, grade crossing, Union road, Cheektowaga, N. Y., to Bethlehem Steel Co., Buffalo.

335 tons, state highway project, bridge, RC-2575, Livingston county, New York, to American Bridge Co., Pittsburgh; Hudson Valley Construction Corp., Avon, N. Y., contractor, $205,539.20;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bids Oct. 18, Albany, N. Y.

300 tons, telephone building, Albuquerque, N. Mex., to E. Burkhardt & Sons Steel & Iron Works, Denver, Colo.

270 tons, Bitterroot river bridge, Hamilton, Mont., to American Bridge Co., Pittsburgh.

270 tons, building, Langley Field, Washington, to Belmont Iron Works, Philadelphia; through Doyle & Russell, Richmond, Va.

270 tons, bridges A-256 and B-547, Atchison, Topeka & Santa Fe railroad, Arizona, to American Bridge Co., Pittsburgh.

250 tons, river crossing towers, Sheffield, Ala., for Tennessee valley authority, to Lehigh Structural Steel Co., Allentown, Pa.

200 tons, addition to livestock building, San Francisco, to Golden Gate Iron Works, San Francisco.

200 tons, building, for Armstrong Cork Co., South Braintree, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

190 tons, replacement hangar, Miami, Fla., to Bethlehem Fabricators Inc., Bethlehem, Pa.

180 tons, Dixie Mercerizing Co., mill building additions, Chattanooga, Tenn., to Converse Bridge & Steel Co., Chattanooga, Tenn.

170 tons, I-beam bridges, R-40117, Luzerne county, Pennsylvania, to Anthrcite Bridge Co., Scranton, Pa.

140 tons, grade crossing elimination, Baltimore & Ohio railroad, North Baltimore, O., for state, to Bethlehem Steel Co., Bethlehem, Pa.

140 tons, grade crossing, Concord, N. Y., to Lackawanna Steel Construction Co., Buffalo.

140 tons, Beaver Creek bridge, Wibaux, Mont., to American Bridge Co., Pittsburgh.

130 tons, Univis Lens building, Dayton, O., to Oregonia Bridge Co., Lebanon, O.

125 tons, market at 840 South Bellflower, Bellflower, Calif., to Pennsylvania Iron & Steel Co., Los Angeles.

110 tons, trash racks and frames, Wiota, Mont., to Kansas City Structural Steel Co., Kansas City, Mo.

110 tons, shop buildings, Kingham Trailer Co., Louisville, Ky., to Louisville Bridge & Iron Co., Louisville.

105 tons, new girders, bridge 35.03, Pennsylvania railroad, Pennsylvania, to American Bridge Co., Pittsburgh.

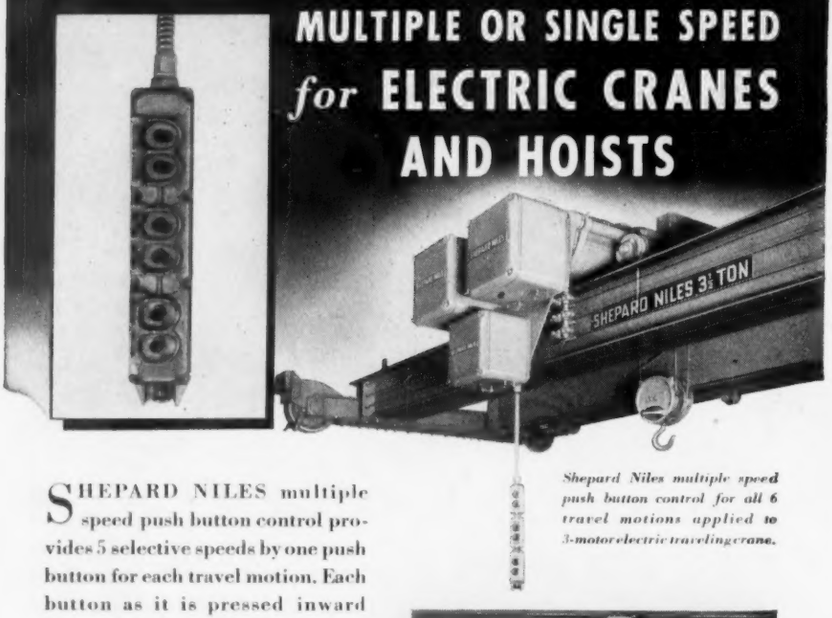
100 tons, grade school, Winnetka, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

100 tons, steel superstructure, old covered bridge, Abbot, Me., to Berlin Construction Co., Berlin, Conn.

Unstated tonnage, steel foundation for new alternator, navy yard, Boston, to New England Structural Co., Everett, Mass.; bids Oct. 16, spec. 9302, Washington.

Push button control

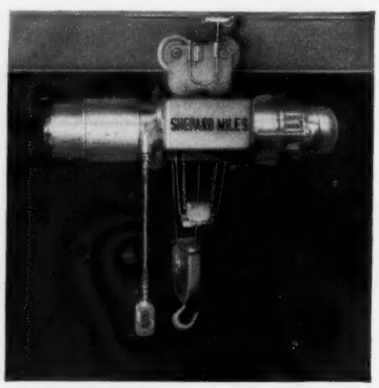
MULTIPLE OR SINGLE SPEED *for* ELECTRIC CRANES AND HOISTS



Shepard Niles multiple speed push button control for all 6 travel motions applied to 3-motor electric traveling crane.

SHEPARD NILES multiple speed push button control provides 5 selective speeds by one push button for each travel motion. Each button as it is pressed inward makes five electrical contacts, corresponding to five independent speeds in each direction of travel

Push button master switch cases are of aluminum alloy and made slender enough to be grasped easily with the hand. An assembly of two or three master switches in tandem can be furnished for the control of 2-motor and 3-motor cranes and hoists. An emergency stop switch is provided at the lower end of the assembly.



Shepard Niles LiftAbout equipped with single speed push button control.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

358 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

Shape Contracts Pending

4730 tons, bearing piles, including 1830 tons sheet steel piling, Sepulveda dam, Los Angeles; bids soon.

3150 tons, high school, Forest Hills, N. Y.; bids Nov. 17, department of education, New York.

1500 tons, vocational school, East New York, Brooklyn, N. Y.; bids Nov. 20.

1200 tons, state of Oklahoma, Merfield & Lawson, Le Reno, Okla., low on general contract.

1000 tons, sheet steel piling, second graving dock, navy yard, Bremerton, Wash.; Macao Construction Co. and Case Construction Co., Clearwater, Calif., low on joint bid.

1000 tons, building, Kings Park hospital, New York; bids Nov. 9.

900 tons, viaduct, L street, Omaha, Nebr., for state.

900 tons, apartment house, for Frank Morrell, New York.

800 tons, addition assembly shop, naval station, Newport, R. I.; Tredennick-Billings Co., Boston, low at $390,750.

750 tons, state highway bridges, New York; bids Nov. 15, Albany.

680 tons, five highway bridges, state of Missouri; bids Nov. 17.

650 tons, addition to refrigerating plant, Deerfield Packing Co., Bridgeton, Pa.; bids through United Engineers & Constructors Inc., Philadelphia; includes 120 tons reinforcing bars.

500 tons, approximately, steel sheet piling for Puget Sound navy yard graving dock; bids in.

500 tons, bridge, east branch Penobscot river, Medway, Me.; bids Nov. 15, Augusta, Me.

500 tons, state bridge, Llewellyn, Nebr.

475 tons, machine shop addition, navy yard, Boston.

450 tons, garage, North Shore Bus Co., Jamaica, N. Y.

450 tons, machine shop and garage, for Texas Co., Port Arthur, Tex.

400 tons, building, for Pacific Telephone & Telegraph Co., Sacramento, Calif.

400 tons, highway bridges, state of

Arkansas; bids Nov. 2.

335 tons, three bridges, state of Wisconsin; bids Nov. 14.

325 tons, extension to building, for Pepsi Cola Co., Long Island City, N. Y.

320 tons, extension to machine shop building No. 42-A, navy yard, Boston.

300 tons, repairs to Thirty-first street bridge, Pittsburgh, for Allegheny county.

300 tons, telephone building, Sacramento, Calif.; bids opened.

254 tons, through span bridge, Snohomish county, Washington; bids at Olympia, Nov. 14.

250 tons, four-story building, Resinous Products Co., Bridesburg, Pa.; bids Nov. 6.

250 tons, state bridges, Morris and Essex counties, New Jersey.

220 tons, beam spans, Middleboro, Ky., for army engineers' office.

215 tons, roll storage building No. 3, for Mead Corp., Chillicothe, O.

210 tons, alterations and additions to forge shop No. 2, for Mesta Machine Corp., Homestead, Pa.

210 tons, factory building, for Chicago Extruded Metals Co., Cicero, Ill.

158 tons, state spans in King and Pierce counties, Washington; bids at Olympia, Nov. 14.

150 tons, bridge, Central of New Jersey, Middlesex county, New Jersey; bids Nov. 10.

150 tons, curbing, 12,750 feet, East River drive, New York, for city.

150 tons, telephone building, Albany, Calif.; bids opened.

150 tons, state bridge over Brush creek, Frazier, O.

150 tons, branch department store, Lit Bros., Philadelphia; bids Nov. 15.

110 tons, H columns, ramps for seaplane hangar, naval air base, Alameda, Calif., Clyde W. Wood, 208 West Eighth street, Los Angeles, low on general contract at $162,500.

110 tons, state bridge, Battle Creek, Iowa.

103 tons, under-crossing, King county, Wash., for state; bids Nov. 14.

100 tons, St. John's Roman Catholic church, Gladwynne, Pa.; bids Nov. 10.

100 tons, shapes and bars, underpass, Central Vermont railroad, Bethel, Vt.; bids Nov. 17, Montpelier.

100 tons, ventilating building, Fulton county, Pennsylvania turnpike commission, Harrisburg, Pa.; revised bids Nov. 10; includes 150 tons reinforcing bars.

100 tons, chapel, College of Holy Child, Rosemont, Pa.; bids Nov. 17.

100 tons, low-cost housing project, Camden, N. J.; bids Nov. 21.

Unstated, 4-span, state bridge, Landers Ford, Mont.; bids in.

Unstated, steel poles for Seattle's trackless trolley system; bids in.

Tin Plate

Tin Plate Prices, Page 82

Tin plate output holds near capacity, the rate last week being estimated at 95 per cent. Mills are heavily booked, some tonnage not being scheduled for delivery until late next quarter. Export business is good, with prices strong, but mills are unable to accommodate more than a normal share of this demand.

Reinforcing

Reinforcing Bar Prices, Page 83

Pittsburgh—Mills are having difficulty scheduling sufficient tonnage to meet deliveries asked by customers. Backlogs extend into first quarter in most cases and while a large part of this material does not require immediate delivery, a certain amount must be shipped at once on projects being rushed to avoid freezing weather.

Chicago—A fairly large tonnage is pending, although inquiries are fewer. Another section of the local subway will be bid Nov. 22, involving 500 tons. Several projects involving about 100 tons each are active. Awards are swelled by placing of 12,000 tons for the local filtration plant with Truscon Steel Co.

Boston—Test of currently firm reinforcing steel prices is expected shortly in the purchase of close to 8000 tons of concrete bars for housing projects, Bridgeport and Hartford, Conn., and Holyoke, Mass. Meanwhile on small lots, few involving more than 100 tons, prices are firm, although in this district shad-

Hackney MILWAUKEE ENGINEERS HELP SOLVE *DIFFICULT* CONTAINER PROBLEMS

You, too, can obtain the benefits of Pressed Steel Tank Company's more than thirty-five years of experience in developing and producing special shapes and shells. Hackney engineers, with their complete understanding of the characteristics of gases, liquids and solids, have aided many manufacturers in developing containers and special shapes in numerous metals (stainless steel, monel metal, nickel, aluminum, Herculoy, Everdur, bronze, copper, various alloys, etc.). The Hackney solution to many container problems paid off in reduced costs, increased efficiency and savings in time.

Hackney pioneered the cold drawing of seamless containers from metal plates. Hackney welding is recognized as being superior. Thus, when you employ the Hackney method, you are assured of better, more dependable products at lower cost.

Hackney engineers will be glad to work with you in developing new shapes or containers to meet your particular problem, or in improving the product which you are now using. Just send the details, or ask to have an engineer call. There is no obligation. Write today.

PRESSED STEEL TANK COMPANY

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DEEP DRAWN SHELLS AND SHAPES

Behind the Scenes with STEEL

War Over Industry

■ IF STEEL'S editors were influenced by the European war the same way the general press has been, you might expect to find market reports such as these in your favorite business paper:

An official communique received here tonight indicates heavy new steel orders massed on the border between the fourth quarter of this year and the first quarter of next. Industrial concerns have strengthened their staffs by calling new classes to the colors in order to be prepared for any eventuality.

Three wood-working outfits were sunk in the industrial sea last night. Captains reported being torpedoed by price-cutters, but competitive interests charged the concerns sunk after striking 77-B mines laid by the companies themselves. The destroyer New Deal was reported in the vicinity at the time.

The high command today denied all knowledge of the whereabouts of first quarter price announcements. When last heard from the announcement was reported being held for scrutiny in a neutral port somewhere between San Francisco and New York. Consuming interests have instructed their ambassadors to press for information on the disposition of the announcement and diplomatic conversations already are under way.

Gook Steel Co., in an official communique, has announced cancellation of all leaves for officers and enlisted men. Reconnoitering in bolts and nuts in the Detroit sector was increased last night. Open hearth positions have been strengthened and additional bessemer and blast-furnace ordnance is being held in readiness.

B. (For Burbank) Shrdlu

■ In the October *Industrial Bulletin* of Arthur D. Little, we find that some smart chemist has beat us to the draw on another of our pet ideas—the seedless watermelon. It is really very simple. A type of plant hormone called auxin (an indole-acetic acid) is applied to the cut-off pollen-receiving elements of the flower and the result is a parthenocarpic fruit. Get it?

Behind Mr. Powell's Scenes

■ Editor Jim Powell, in Chicago, complains some receptionists do neat tricks when he mumbles he is from STEEL magazine, or the magazine STEEL. "There is a Mr. Howell, Dowell, Rowell or Paul here," they cackle to the boss. "He is from a Manganese Steel Co., a Mezzanine Steel Co., the Steel Magneting Co. (or the pay-off recently) the Maggoty Steel Co." J. P. says he knows he should present a card but then they call him Mr. Steel. There should be some form of legislation in restraint thereof.

Advertising Highspots

■ On pages 57 and 97 this week Shell Oil and Penola have the beginnings of a swell menagerie. And if you feel like breaking out in song, turn to page 13.

The Fly & The Bicycles

■ If you don't like railroads, perhaps you'll go for bicycles. Once upon a time there was a road 20 miles long. At each end was a bicyclist, who at the same time started riding toward one another at a constant speed of 10 m.p.h. until their front wheels touched. At the instant they started, a fly, perched on the front wheel of one bicycle started to fly toward the other at 15 m. p.h. He flew until he touched the other front wheel and instantly started back. And so he went, back and forth, until he was crushed right smack between the two as they met. The question, of course, is how far did the little fly fly?

SHRDLU

ing has not entirely disappeared.

New York—Although contractor-buyers are seeking concessions, concrete bar distributors are generally holding to 2.15c, Sparrows Point, on a limited volume. Some are meeting with additional delivery delays from mills.

Seattle—Quantity of reinforcing bars involved in the graving dock at Puget Sound navy yard will not be known until the general contract is placed as alternate specifications call for varying amounts. The low joint bid for the four items was submitted by Macco Construction Co. and Case Construction Co., Clearwater, Calif. The job will require 1000 tons, more or less.

San Francisco — While awards were not heavy, aggregating less than 1250 tons and bringing the total to date to 146,819 tons, compared with 123,035 tons for the corresponding period in 1938, pending business calls for more than 20,000 tons.

Reinforcing Steel Awards

12,093 tons, east substructure, city filtration plant, Seventy-ninth street and Lake Michigan, Chicago. Michael Pontarelli & Son Inc., Chicago, general contractor, to Truscon Steel Co., Youngstown, O.

850 tons, housing project, Boston, to Joseph T. Ryerson & Son Inc., through C. J. Maney Co. Inc., Somerville, Mass.

600 tons, Glenside housing project, Reading, Pa., to Sweets Steel Co., Williamsport, Pa.; J. A. J. Construction Co., contractor.

500 tons, Laurel Homes housing project, Cincinnati, to Pollak Steel Co., Cincinnati; F. Messer & Sons, contractor.

375 tons, dam, Spencer, Nebr., to Bethlehem Steel Co., Bethlehem, Pa.; Fegeles Construction Co., contractor.

335 tons, tanker dock and barge pier, Standard Oil Co., Bayway, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

316 tons, paint shop and transformer building, navy yard, Mare Island, Calif., specification 8984, to Soule Steel Co., San Francisco.

210 tons, bridge 1845, Knox county, Indiana, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, bridge 1820, Valparaiso, Ind., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, William Howard Day homes, Harrisburg, Pa., to Republic Steel

Concrete Bars Compared

	Tons
Week ended Nov. 4	**16,514**
Week ended Oct. 28	**9,112**
Week ended Oct. 21	**9,439**
This week, 1938	**11,828**
Weekly average, year, 1938	**6,959**
Weekly average, 1939	**9,923**
Weekly average, October	**10,421**
Total to date, 1938	**299,071**
Total to date, 1939	**436,604**

Includes awards of 100 tons or more.

Corp., Cleveland, through Truscon Steel Co., Youngstown, O.; Ritter Bros., contractors.

150 tons, underpass, East Ninth street, Cleveland, to Republic Steel Corp., Cleveland through Paterson-Leitch Co., Cleveland.

120 tons, bridge, Monticello, Ill., to Laclede Steel Co., St. Louis.

110 tons, auditorium, Wailuka high school, Honolulu, T. H., to Bethlehem Steel Co., San Francisco.

105 tons, Sears, Roebuck store, Seattle, to Seattle Steel Co.

100 tons, bridge, Rushville, Ind., to Joslyn Mfg. & Supply Co., Fort Wayne, Ind.

100 tons, office building, Madison, Wis., to Inland Steel Co., Chicago.

100 tons, plus, plant improvement Everett Pulp & Paper Co., to Bethlehem Steel Co., Seattle.

100 tons, Washington state school, Buckley, to Seattle, Steel Co., Seattle.

Reinforcing Steel Pending

4000 tons, superstructure, Vladek housing project, New York; George A. Fuller Co., New York, low, $4,605,659, bids Oct. 30.

3636 tons, schedule 3693, Panama Canal; bids Nov. 7.

3275 tons, Sepulveda dam, Los Angeles for United States Engineer Office; bids soon.

2500 tons, United States Engineer Office, Los Angeles for Los Angeles river improvement work between Doney road and Randolph street, Los Angeles; bids soon.

1800 tons, housing project (colored), Chicago.

1000 tons, dam, army engineers, Woodward, Okla.

1000 tons, approximately, Puget Sound, Wash., navy yard graving dock; Macco Construction and Case Construction Co., Clearwater, Calif., joint low bidders.

1000 tons, addition to Consolidated Aircraft Corp. plant, San Diego, Calif.; bids being taken.

610 tons, highway projects, New York state; bids Nov. 15, Albany.

500 tons, United States engineer office, Los Angeles, for Burbank-Western wash; bids soon.

500 tons, subway section D-6B, Chicago; bids Nov. 22.

500 tons, building, Eastman Kodak Co., Chicago.

400 tons, engineering and laboratory building, navy yard, Philadelphia; bids Nov. 15.

305 tons, turret and erection shop, navy yard, Brooklyn; bids in.

280 tons, viaduct, New York Central railroad, Eleventh avenue, New York; Elmhurst Contracting Co., New York, contractor.

250 tons, seawall, navy yard, Brooklyn; bids in.

200 tons, apartments, Clarendon Corp., Madison, Wis.

200 tons, officers quarters, Coco Sola, C. Z.; bids Nov. 15.

190 tons, bridge, L street, Omaha, Nebr.

180 tons, mesh, warming up apron Hickam Field, T. H., Robert E. McKee, 4700 San Fernando boulevard, Los Angeles, low on general contract.

150 tons, various Washington state highway projects; bids at Olympia, Nov. 14.

136 tons, building, Mead, Johnson & Co., Evansville, Ind.

130 tons, building 18, navy yard, Brooklyn; H. L. Rice Co., New York, contractor.

120 tons, sub piers, State street bridge, Chicago.

110 tons, Washington state bridge approach, Snohomish county; bids at Olympia, Nov. 14.

100 tons, post office, Hammond, Ind.; James McHugh Co., Chicago, low on contract.

Cold-Finished Steel

Cold Finished Prices, Page 83

Separate base prices on various diameters of turned and ground shafting have been announced by Cumberland Steel Co., Cumberland, Md. Base on sizes 1 15/16 to 8 inches inclusive is 2.65c, the same as for cold-drawn bars. Bases on other sizes are: 2.45c for 1 9/16 to less than 1 15/16 inches; 2.40c for 1 3/16 to less than 1 9/16 inches; 2.20c for 1⅛ to less than 1 3/16 inches. This revision places shafting of 0.30 per cent carbon and under at the same prices as cold-drawn and ground shafting of the same analysis, with material of 0.30 to 0.45 per cent carbon slightly more for some sizes

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and slightly less for others than cold-drawn and ground shafts.

Pig Iron

Pig Iron Prices, Page 84

Pittsburgh—Production here lately has been the largest since the summer of 1937, and November will probably show a further gain. At the close of the month, 41 district furnaces were in blast, with five more slated to start before end of the year. Coke operations are likewise increasing slowly.

Cleveland — November is expected to retain or extend the 20 per cent gain in October shipments. A fair volume of buying continues, although most deliveries are against contracts. Only a moderate tonnage is indicated going into inventory. By-product foundry coke has been advanced 75 cents.

Chicago—October shipments were about 30 per cent ahead of September and are holding steadily. Sales are not prominent, orders being mostly small lots. Coke shipments were 12 per cent ahead of the previous month and are expected to do as well this month. First quarter books may open as usual around the first of December.

Boston — Interest is centered on possible price changes next quarter, although little buying is attributed to expectations of an increase. Consumption is sustained, generally being higher than in early fall, except for district cast iron pipe production.

Philadelphia — Consumption is heavier than expected, and some iron scheduled for December shipment is being asked for sooner. Export inquiry includes 1500 tons of hematite iron for Sweden.

Buffalo — October shipments showed a 25 to 35 per cent gain. Increased demand is general, with most foundries working five days weekly. Inventory additions are small. Coke supplies are scant and shipments from Canada are expanding, currently about 300 tons daily.

Cincinnati — October shipments were better than predicted earlier, being close to the volume of September, when there was a rush to build up inventories. Foundry operations are estimated about 60 per cent, with producers of machine tool castings busiest. By-product foundry coke is up 75 cents.

St. Louis — Preliminary estimates by sellers indicate October shipments will exceed September by fully 25 per cent. Despite recent heavy deliveries, inventories of industries have not expanded much owing to current heavy melt.

Birmingham, Ala. — All of the district's 18 blast furnaces are being pushed to capacity to meet pig iron requirements. Mill furnaces are hardly turning out sufficient iron for current needs, and merchant melters report some quickening in demand and in shipping instructions.

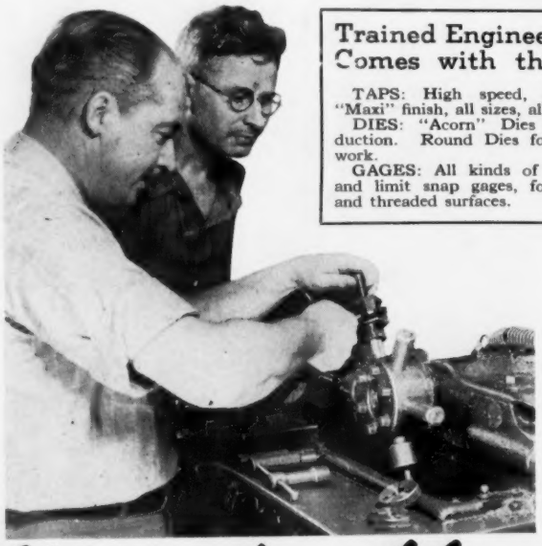
Toronto, Ont.—New interest is developing, and inquiries are appearing for first quarter delivery, although producers will not open books for 1940 bookings for another month at least. Prices are firm, with prospects of advances later in the year. Sales hold around 1000 tons a week, while shipments against contract are above average.

Ferroalloys

Ferroalloy Prices, Page 84

New York — Recent $10 advance to $110, tidewater, on spot ferromanganese by a leading eastern Pennsylvania seller has yet to be followed by others. Most consumers are under contract at $100 for this quarter. Strength in ferromanganese is reflected from prices paid for manganese ore last week by the government in a purchase under the strategic and critical materials act.

The latter included 25,000 long tons of manganese ore placed with the Cuban American Manganese Corp., New York, at 61.2 cents per long ton of contained manganese, c.i.f., Baltimore, and 5000 tons ordered from Greenbrier Mining Corp.,



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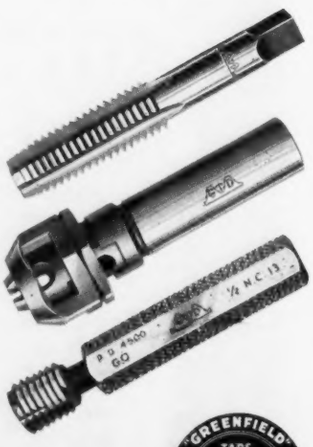

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White Sulphur Springs, W. Va., at 75 cents, f.o.b. cars, Curtis bay, Maryland. Specifications require a minimum manganese content of 48 per cent. Bids for chromium ore, opened Oct. 20, were rejected, offers not complying with specifications.

Scrap

Scrap Prices, Page 86

Pittsburgh—The market continues strong but uneventful. Sales are being made at unchanged prices, with brokers covering short positions at corresponding levels. Shipments are in fair volume. Railroad lists are larger than a month ago but still relatively small.

Cleveland—Softening in adjacent markets has caused some weakness here in heavy steel grades, which have yielded about 50 cents per ton.

Chicago — The market shows no outward evidences of either strength or weakness. Heavy melting steel is unchanged. Some other grades, in cases where supply exceeds demand, including cast scrap, are lower. Conversely, improved demand for other grades has made their quotations firmer.

Boston—New business has leveled off, with price changes few. Scattered lots of heavy melting steel are being bought for export, mostly at $18.25, dock, for No. 1. Export buying has slackened materially and is having less influence on domestic quotations.

New York—No. 2 heavy melting steel is up $1 at Jersey City to $17, cars, for shipment to eastern Pennsylvania. Foundry grades are inclined to lag but prices are firm. Export inquiry is heavier, Sweden, Italy and Japan considering large purchases. Broker buying for export is at unchanged prices for No. 1 steel.

Philadelphia — Some mills have turned to No. 2 steel in place of No. 1 and breakable cast, thereby narrowing the spread between the two heavy melting steel grades to $1. Old bundles are up 50 cents, and the entire market has a firmer tone. Recent export business has been from Japan, Italy and Sweden. A rumored large British inquiry is not substantiated.

Detroit — The market continues static, with a little weakness resulting from a suspension of shipments by one steelmaker in order to relieve congestion of cars at the mill. Busheling, forge flashings and short shoveling turnings have been reduced 50 cents.

Buffalo — The market has a stronger undertone, with disappearance of pressure for lower prices. No. 1 steel has been sold into consumption within the prevailing range for that grade. A leading consumer is holding up shipments for about two weeks in order to absorb a boat delivery from the Duluth area.

Cincinnati—Prices are steady, but buyers evidence less fear of immediate shortages and are resisting higher quotations. Inventories of consumers are adequate for the present.

St. Louis — Mixed trends prevail in the market. Heavy melting steel has declined, while cast grades are in good demand and sharply higher. No. 1 machinery cast is up $2 to the highest level in more than two years. Offerings of most grades continue light from outside districts, and dealers are loath to sell short.

Toronto, Ont.—Improved demand is reflected in a shortage of some grades. No. 1 cast scrap is at a premium and very scarce. No. 1 heavy melting steel also has a brisk call, with very little material available, but in No. 2 grade, supplies are fairly plentiful.

Seattle—The market is slightly

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easier following the rapid rise of prices in recent weeks. Good material is generally quoted at $17 to $18. Old commitments have been forwarded and little new business is coming from the Orient, Japan hesitating to pay the prevailing high c.i.f. prices.

Warehouse

Warehouse Prices, Page 85

Cleveland — Sales are sustained near the improved level of late October. Galvanized sheets are up 10 cents. New size extras are being adopted on cold-finished alloy bars, reflecting recent mill changes.

Chicago — Demand has leveled at the higher point attained recently. October business was the best since second quarter of 1937. Warehouse stocks are good, additions balancing shipments.

Boston—Applying in Connecticut territory only, galvanized sheets out of warehouse have been advanced 25 cents per 100 pounds, the Boston price, 4.86c, being unchanged. Buying is brisk and well diversified.

New York — Additional advances on several products appear imminent, following increases in galvanized sheets and long ternes. Demand continues heavy and October was the best month this year. Stocks generally are well balanced.

Philadelphia—Galvanized sheets have been raised 25 cents to $4.93 per 100 pounds in lots of ten bundles and over. Sales continue brisk though lighter than some expected.

Buffalo — Sales in October expanded to a two-year peak, 25 per cent ahead of September. Demand shows no signs of leveling off.

Cincinnati — Business for early-November delivery shows no slackening. Prices are unchanged. Shortages have appeared in only a few items.

St. Louis — October developed a notable increase over September. Seasonal demand from the rural sections is better than expected, and expansion in buying by the general manufacturing trade continues.

Seattle — Volume of sales has eased, following the heavy buying several weeks ago. Prices are firm in Portland territory but Seattle dealers have been unable to stabilize conditions.

Fluorspar

Fluorspar Prices, Page 84

Imported and domestic fluorspar prices have been advanced. Foreign spar, recently quoted $25 per net ton, duty paid, tidewater, has been raised to $26 to $27. Washed gravel spar, Illinois-Kentucky mines, is up $2 to $22 for both rail and barge delivery. No. 2 lump also is quoted $22.

Steel in Europe

Foreign Steel Prices, Page 85

London — (*By Cable*) — Steel and iron prices have been advanced in Great Britain, from Nov. 1, when the stabilization period expired. Pig iron is up 9s per ton, semifinished steel, structurals, rails and plates £1, merchant steel 24s, black and galvanized sheets 27s 6d. Production of iron castings is reviving. Pig iron output at present is sufficient without resortng to Continental imports. Foreign ore deliveries are now inadequate but stocks are sufficient for present needs.

Deliveries to ordinary commercial steel users is much extended, owing to heavy government priority contracts. Belgium and Luxemburg report export demand is slackening but British and Dutch business remains substantial.

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Iron Ore

Iron Ore Prices, Page 86

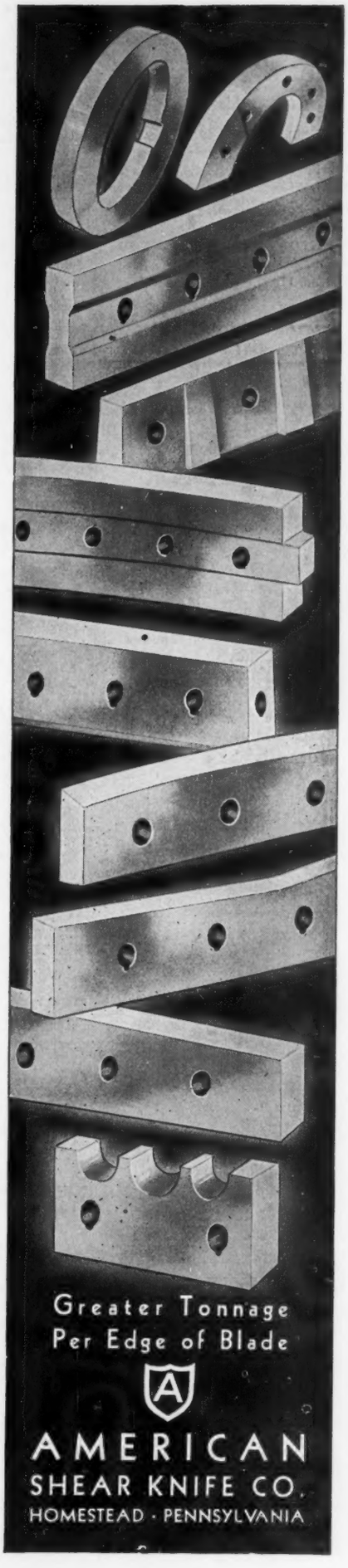
Cleveland—October shipments of Lake Superior iron ore from upper lake ports were the heaviest for the month since 1926. Tonnage was 9,201,249, against 7,865,007 in September and 3,624,416 a year ago, according to the Lake Superior Iron Ore association. Movement to Oct. 1 totaled 39,593,570 tons, 122.7 per cent larger than the 21,811,864 tons moved a year ago.

Coke Oven By-Products

Coke By-Product Prices, Page 83

New York—Manufacturing chemical and industrial demand for coke oven by-products is heavy. While production is highest in many months, available supplies are short. Distributors in some instances are four weeks behind in shipments, phenol being a notable example. The plastic trade is taking large shipments. Distillates are moving to consumers to the extent of current output, paint, varnish, lacquer and chemical consumers accounting for heavy deliveries. Napthalene buying has also increased.

Export inquiry is brisk, but some distributors covering domestic trade first, are unable to take on this busi-



ness. Prices are firm on all by-products.

Equipment

New York—Machine tool buying continues brisk, purchases during the last two months having amounted to practically the volume of a normal year with numerous sellers. October sales were the best of the year, topping September's, which were also heavy. Shops and dealers are less certain as to prices with deliveries becoming more lengthened. Many tools now being booked can not be shipped before midsummer and it is increasingly difficult to estimate costs. Some are selling at prices subject to adjustment at time of assembly and shipment. Others have made advances of 10 per cent on various lines, while some have marked up to 12½ per cent.

A French commission has arrived to purchase machinery, but has met with none too cordial reception thus far, due to somewhat unsatisfactory terms and delivery requirements. Purchases are being made by a widely diversified range of industrial producers, but a substantial volume still is due directly or indirectly to government activity.

Boston—Machine tool orders for Canadian plants are reaching New England shops in increasing volume. A Vermont builder of automatic screw machinery is sold ahead several months on such business placed by the British commission, now in the Dominion speeding the allied armament program. As domestic orders continue to pile in, further extending deliveries, the price situation is more confused. Shop assembly schedules are at capacity with overtime rule. Winchester Repeating Arms Co., New Haven, Conn., is buying heavily in its tooling program for the manufacture of 68,000 semi-automatic rifles for the United States army.

Weekly lists appear for the Springfield, Mass. armory, the latest including six automatic screw machines, five universal grinders and a broaching machine. Watertown, Mass., arsenal closes Nov. 9 on six horizontal boring mills with fixtures. Crane inquiry is active, with four 3-ton wall cranes for the Boston and Portsmouth, N. H. navy yards closing Nov. 8.

Chicago — Machinery interests found October bookings about 30 per cent ahead of September, continuing at a good rate this month. A few export inquiries and orders have been received, but the total is not significant. Present demand is

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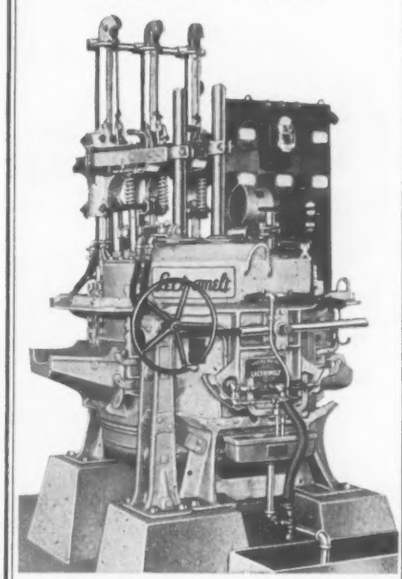

The illustration shows a small capacity three phase direct arc LECTROMELT furnace. Furnaces as small as 500 lb. capacity are being used for pouring forging ingots.

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chiefly from heavy manufacturing industries and railroads. Wabash railroad put out a new list last week, which is about the largest pending in machine tools here.

Seattle — Heavy electric machinery is leader, but powerline equipment, pumps and similar items are also in good demand. Denver has called bids Nov. 27 for furnishing 7000-horsepower hydraulic turbine, generator, transformers, switches and other items for the Minidoka

Nonferrous Metal Prices

Oct.	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York *Spot	Straits Tin, New York *Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
28	12.50	12.50	12.12½	55.75	49.50	5.50	5.35	6.50	20.00	14.00	35.00
30	12.50	12.50	12.12½	55.50	49.00	5.50	5.35	6.50	20.00	14.00	35.00
31	12.50	12.50	12.12½	55.00	49.00	5.50	5.35	6.50	20.00	14.00	35.00
Nov.											
1	12.50	12.50	12.12½	54.00	47.50	5.50	5.35	6.50	20.00	14.00	35.00
2	12.50	12.50	12.12½	54.00	47.50	5.50	5.35	6.50	20.00	14.00	35.00
3	12.50	12.50	12.12½	53.00	47.00	5.50	5.35	6.50	20.00	14.00	35.00

*Nominal.

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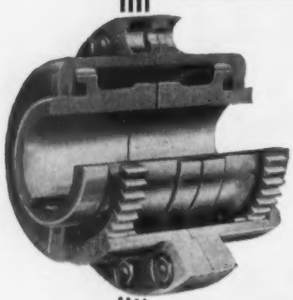

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Yellow brass (high)	19.06
Copper, hot rolled	20.87
Lead, cut to jobbers	8.30
Zinc, 100 lb. base	11.25

Tubes

High yellow brass	21.81
Seamless copper	21.37

Rods

High yellow brass	15.23
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.31

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	8.37½-8.50
Cleveland	9.25-9.50
Chicago	8.75-9.00
St. Louis	8.50-8.75

Heavy Copper and Wire

New York, No. 1	10.00-10.25
Cleveland, No. 1	10.25-10.50
Chicago, No. 1	10.00-10.25
St. Louis	9.75-10.00

Composition Brass Turnings

New York	8.00-8.25

Light Copper

New York	8.00-8.25
Cleveland	8.25-8.50
Chicago	7.87½-8.12½
St. Louis	7.75-8.00

Light Brass

Cleveland	5.00-5.25
Chicago	5.62½-5.87½
St. Louis	5.00-5.50

Lead

New York	4.85
Cleveland	4.62½-4.75
Chicago	4.25-4.50
St. Louis	4.00-4.25

Zinc

New York	3.50-3.75
Cleveland	3.25-3.50
St. Louis	3.75-4.00

Aluminum

Mixed, cast, Cleveland	9.75-10.00
Borings, Cleveland	7.25-7.50
Clips, soft, Cleveland	16.00-16.50
Misc. cast, St. Louis	8.25-8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	13.75
Standard No. 12 aluminum	14.75-15.50

project, Idaho. S. Morgan Smith Co., York, Pa., is low at $965,475 to United States engineer, for furnishing two turbines for the Bonneville power home and Woodward Governor Co., Rockford, Ill., is low at $113,706 for furnishing equipment, same project.

General Electric Co. has the award at $1,409,734 for two 60,000-kva generators for the Bonneville power plant. Bonneville Authority, Portland, has placed a contract with Aluminum Corporation of America, Pittsburgh, at $387,444 for furnishing two million feet of steel reinforced aluminum cable for the 230,000-volt line between Kelso, Wash., and Seattle.

Nonferrous Metals

New York—Tapering in demand for nonferrous metals failed to have any depressing affect on the market last week since producers have heavy order backlogs and many are making record-breaking shipments. While undertone of the domestic tin market has eased, other major markets held firm and unchanged.

Copper—Fabricators are operating close to capacity and are taking heavy shipments. Their needs are well covered into 1940 so pressure for coverage has lifted completely. Strength of the market was reflected in the firm 13-cent f.a.s. level prevailisg in the export market and the rise in the outside market to 12.75c. All first hands continued to quote electrolytic at 12.50c, Connecticut.

Lead—Lighter demand for lead relieved producers from the necessity of drawing heavily on reserve stocks although daily intakes generally were balanced. Prices held firm on the basis of 5.35c, East St. Louis, and 5.50c, New York.

Zinc—With the galvanized sheet output rate holding at 79 per cent, price sentiment was firm. Consumers are in a well-bought position, however, and demand was rather light. Prime western again held at 6.50c, East St. Louis.

Tin—A record-breaking volume of tin is afloat to this country and since no shipments so far have been seized, a softer price tone developed. Straits spot declined nominally to around 53.00c from 55.75c at the end of the previous week. The International Tin committee raised the export quota for the fourth quarter to 100 per cent of standard tonnages and declared that the first quarter quota would not be fixed at a rate of less than 60 per cent. Tin plate mill operations are at 95 per cent with most mills striving for top production compared with an average rate of about 70 per cent for September.

Antimony—Buying generally was routine with American spot unchanged at 14.00c, New York, in cases. Chinese spot advanced to the nominal quotation of 16.50c, duty paid New York.

■ Heavy-duty steel barrels and drums produced in September numbered 1,163,465 units, representing 73 per cent of capacity, the bureau of the census reports. In August output was 826,941 units, 51.9 per cent of capacity; in September, 1938, it was 783,592 units, 48.7 per cent. In nine months this year 7,167,940 units were made, at 50.1 per cent of capacity, compared with 6,096,502 units at 42.1 per cent in the same period last year.

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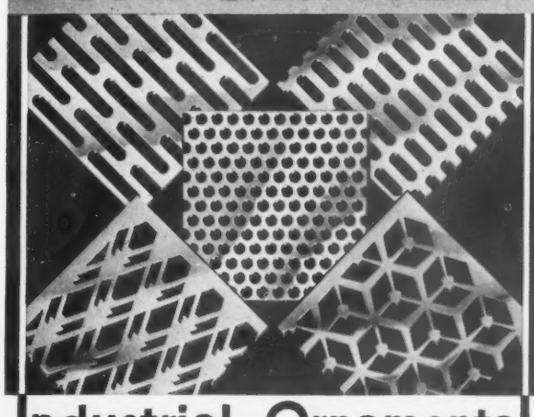

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Construction and Enterprise

Michigan

ADRIAN, MICH.—Gerity-Adrian Mfg. Co. will build addition to present plant. Company manufactures various types of finished metal castings and plumbing fixtures.

GLADWIN, MICH.—City plans waterworks system, including 75,000-gallon capacity elevated steel standpipe, turbine pump, centrifugal pump, mains, meters, recording apparatus. Shoecraft, Drury & McNamee, Savings Bank building, Ann Arbor, Mich., engineers.

POSEN, MICH.—Presque Isle county electric co-operative association, G. J. Kleher, manager, has $112,000 REA allotment for 107 miles rural transmission line in Alpena, Cheboygan and Montmorency counties.

Maine

PATTEN, ME.—Farm-Home Electric Co-operative Inc., H. Wood, president, has $127,000 REA allotment for 108 miles rural transmission line in Aroostook and Penobscot counties.

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New York

UTICA, N. Y.—F. W. Woolworth Co., 75 State street, Albany, N. Y., plans installation of air conditioning system and escalators in building here; to cost over $25,000.

Pennsylvania

HARRISBURG, PA. — Pennsylvania Power & Light Co., David A. Elias, vice president in charge of Pittsburgh district, plans enlargement and improvement of plant here. Present production of 20,000 kilowatts to be increased to 40,000. Expenditure of about $3,000,000 planned.

PHILADELPHIA—Philadelphia Electric Co. has purchased site in South Philadelphia where it will build $45,000,000 generating station to be tied in with other generating plants, including Conowingo hydroelectric development in Maryland.

Ohio

AMHERST, O.—Village, Charles A. Miller, clerk, will take bids soon on construction of power and light plant with PWA aid, to cost about $145,000. Floyd G. Browne, Marion, O., consulting engineer.

MILLERSBURG, O.—Holmes Rural Electric Co-operative Inc., George Hefferline, superintendent, plans 43 miles extensions to rural transmission lines in Holmes, Wayne, Ashland, Coshocton counties. Project approved at Washington, work will probably start about Dec. 1.

Illinois

CHICAGO—Metal Box & Cabinet Co., 4716 West Lake street, plans construction of 2-story and basement factory building to cost about $50,000.

CHICAGO—Great Lakes Spring Corp., automobile seat springs manufacturer, is building a 1-story, 40,000 square foot addition to its plant in Clearing industrial district.

Alabama

MOBILE, ALA.—Mobile & Ohio Railroad Co. has applied for permit to improve its river front property; will erect fruit and banana shed, modern office building and install new conveyor system. Estimated cost, $68,000.

MUSCLE SHOALS, ALA. — Electro-Metallurgical Co., 30 East Forty-second street, New York, subsidiary of Union Carbide Co., Carbide & Carbon building, New York, reported planning construction of additional plant units here.

SELMA, ALA.—Central Alabama Cold Storage & Locker Corp., G. B. Suttles, president, will soon call for bids on construction and equipment for new plant; to cost about $30,000.

SELMA, ALA.—Farmers' Meat Processing Co., Alston Keith, attorney, plans refrigerated locker plant. To contain 100 lockers with refrigeration capacity of 2,000,000 pounds per year. Approximate cost, $20,000.

District of Columbia

WASHINGTON — Bureau of supplies and accounts, navy department, will take bids on the following:

Bids due 10 a. m., Nov. 10, on one motor driven Pantograph engraving machine.

Bids due 10 a. m., Nov. 14, on miscellaneous portable electric drills; miscel-

laneous chain hoists; pneumatic drills, grinders and hammers; one gasoline engine driven portable air compressor; 100 hand operated portable spray pumps.

Kentucky

ASHLAND, KY. — American Rolling Mill Co., N. Milan, Curtis street, Middletown, O., chief engineer, will install reduction mill to replace part of present equipment.

CYNTHIANA, KY.—Harrison County Rural Electric Co-operative Corp., G. L. Bridwell, superintendent, Fred Weigel, resident engineer, has $103,000 REA allotment for 113 miles rural transmission line.

ELKTON, KY.—Pennyrile Rural Electric Corp. has been allotted $93,000 REA fund for rural transmission line.

Florida

FT. PIERCE, FLA.—State marketing bureau plans construction of $10,000 fruit washing plant; will install modern machinery.

Georgia

LAGRANGE, GA.—Troup County Electric Membership Corp. has $69,000 REA allotment for rural transmission line.

NAHUNTA, GA.—Okefenoke Rural Electric Membership Corp. has secured $196,000 REA loan for rural transmission line.

SAVANNAH, GA.—Central Railway of Georgia, H. D. Pellard, receiver, plans rebuilding burned warehouses and repair shop.

Mississippi

BAY ST. LOUIS, MISS.—Coast Electric Power association has $40,000 REA allotment for rural transmission line.

Arkansas

LITTLE ROCK, ARK.—First Electric Co-operative Corp. has applied for permission to construct rural transmission lines in Cleburne, White counties.

Oklahoma

BINGER, OKLA.—Caddo electric co-operative has $41,000 REA allotment for 51 miles rural transmission line in Caddo and Kiowa counties.

COLLINSVILLE, OKLA. — Verdigris Valley Electric Co-operative Inc., L. H. Lange, superintendent, has $91,000 REA loan for 106 miles rural transmission line in five counties.

HOLLIS, OKLA.—Harmon Electric Association Inc. has been granted $124,000 REA loan for 200 miles rural transmission line in Greer, Harmon, Jackson counties in Oklahoma, and Hardeman and Childress counties in Texas.

WALTERS, OKLA.—Cotton electric co-operative, C. W. Cox, superintendent, has been allotted $106,000 REA fund for 120 miles rural transmission line in five counties.

Wisconsin

LA CROSSE, WIS.—Northern States Power Co., H. H. Watson, 15 South Fifth street, Minneapolis, general construction superintendent, will open bids Nov. 17 on superstructure for steam-electric generating plant, total cost of project to be $1,560,000. Public Utility Engineering & Service Co., 231 South La Salle street, Chicago, engineers.

Minnesota

FERGUS FALLS, MINN.—Lake region electric co-operative, Albert R. Knutson, superintendent, has been allotted $175,000 REA fund for 163 miles rural transmission line in Otter Tail, Wilkin, Becker, Grant, Clay counties.

LITCHFIELD, MINN.—Meeker light and power co-operative, Irving J. Clinton, superintendent, has been allotted $118,000 REA fund for 94 miles rural transmission line in Meeker, Stearns and Kandiyohi counties, to serve 235 customers.

MANKATO, MINN.—Carney Rockwool Co., Harry E. Carney Jr., president, plans installation of two additional high temperature cupola furnaces, metal blowing chambers and conveyors in new $150,000 rock wool manufacturing plant.

MINNEAPOLIS—Cowin & Co., James Cowin, president, manufacturers of metal products and reinforcing steel distributors, have started construction of 1-story factory addition.

RED WING, MINN.—City, S. T. Ervine, clerk, will vote on special bond issue, at annual election in the spring, for new sewage disposal plant. James F. Enz is city engineer.

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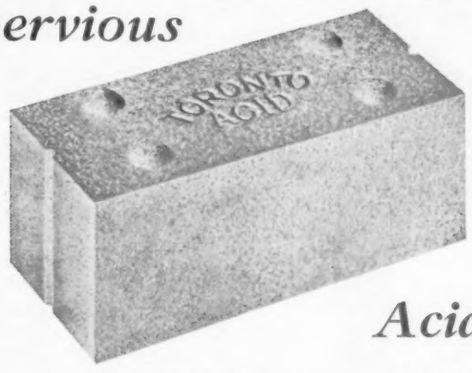

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ST. JAMES, MINN.—South central electric association, Edward C. Meier, superintendent, has been granted $91,000 REA loan for 97 miles rural transmission line in four counties, to serve 220 customers.

Texas

CLEVELAND, TEX.—City plans $15,000 expenditure for improvements to electric system. Will build transformer station, replace some equipment. W. W. Jacobs, manager.

LIVINGSTON, TEX. — Sam Houston electric co-operative of Polk county has secured $223,000 REA allotment for 200 miles rural transmission line to serve about 600 customers.

Kansas

HUTCHINSON, KANS.—Kansas Power & Light Co., W. S. Wick, manager, is contemplating construction of power line from Partridge to Arlington, Kans.

North Dakota

KINDRED, N. DAK.—Cass county electric co-operative, Albert Berseth, president, is taking bids to 1 p.m., Nov. 8 on construction of 208 miles rural transmission line in Cass, Richland, Traill counties. Specifications on file with owner or M. S. Hyland, consulting engineer, Fargo, N. Dak. Certified check 5 per cent to accompany bids.

South Dakota

SIOUX FALLS, S. DAK.—Sioux empire electric association, Sioux Falls; Sioux valley electric association, Brookings, S. Dak.; and east central electric association, Flandreau, S. Dak., have merged under the name of Sioux valley empire electric association. Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, have been retained as engineers on REA project involving rural transmission lines in Lake, Kingsbury, Brookings, Moody, and Minnehaha counties as well as central sub-station to supply necessary current. $878,000 REA loan has been made available for project.

Iowa

BETTENDORF, IOWA—Standard Oil Co., Herbert Johnson, 735 Federal street, Davenport, Iowa, construction superintendent, is taking bids on a 1-story 30 x 80 foot shop and warehouse and for seven steel storage tanks of 8,000,000 gallons capacity.

FT. DODGE, IOWA—Plymouth Processing Mills, L. E. Armstrong, president, announces intention to rebuild soybean processing plant destroyed by fire Oct. 19 with loss of $250,000.

GRAND JUNCTION, IOWA—City plans construction of sewage disposal system, to cost $175,000. Currie Engineering Co., Webster City, Iowa, engineer.

WATERLOO, IOWA—Litchfield Mfg. Co. has been incorporated to manufacture farm machinery and equipment. J. W. Rath is president; R. A. Rath, vice president; A. D. Donnell, secretary; and Howard H. Rath, treasurer.

Montana

BUTTE, MONT.—Henry Stanley has started construction of 1-story toy factory, 24 x 60 feet.

Pacific Coast

LOS ANGELES—Consolidated Steel Corp. plans construction of steel frame mold loft, 70 x 273 feet, at Slauson and Eastern avenues. No cost estimate yet.

SPOKANE—Kromona Mines Inc., J. F. Krom, president, Peyton building, plans erection of refining mill on copper properties in Sultan basin.

WINLOCK, WASH.—Thomas Wilson and associates planning large capacity tie mill.

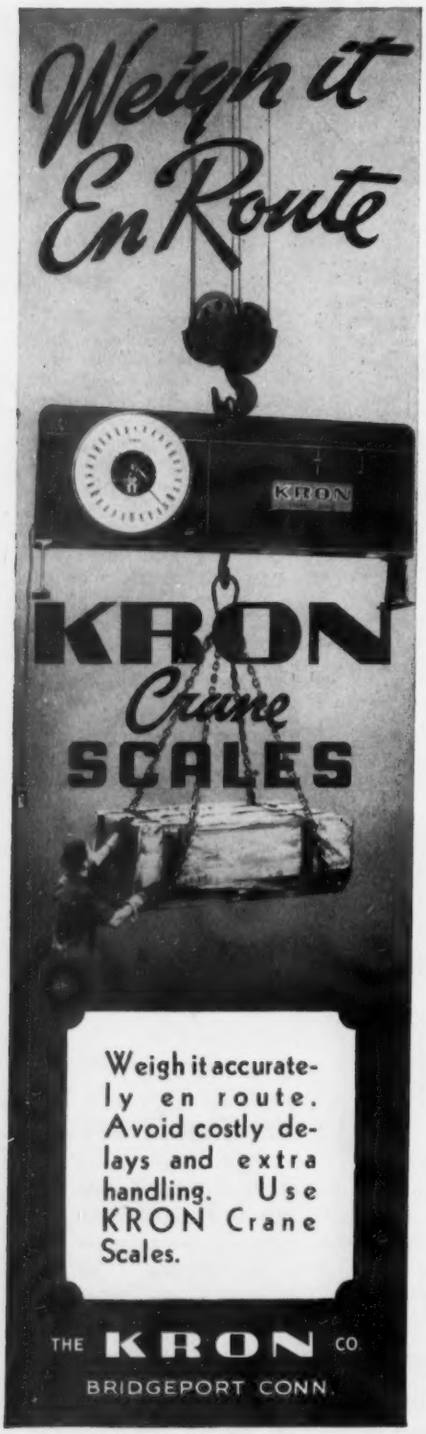
Canada

SASQUETI ISLAND, B. C.—Santiago Mines Ltd., 1203 Mathews avenue, Vancouver, B. C., will construct 50-ton mill plant to cost $75,000. R. Crowe-Swords, mine manager.

LONDON, ONT.—Kellogg Co. of Canada Ltd., W. P. Butler, Dundas street, manager, plans $100,000 addition to factory here.

TORONTO, ONT.—J. T. Hepburn Ltd., Geary avenue, has completed plans, will call for bids soon on construction of $20,000 addition to machinery manufacturing plant.

MONTREAL, QUE.—A. E. Whitehouse, 976 St. George street, will start work immediately on erection of machine shop to cost about $20,000.



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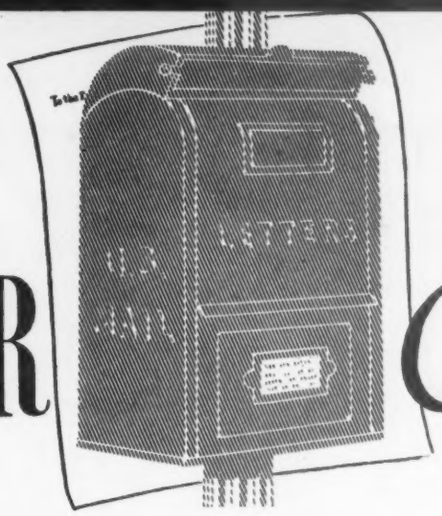

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

Pennsylvania Leads Way

To the Editor:

Now that the state of Pennsylvania has realized the error of persecuting industry and has turned to inviting business, (STEEL, Nov. 6, p. 42), it is too bad the federal administration does not have a similar change of heart.

In the Keystone state labor politicians became so arrogant and attempted to cover so much ground in efforts to rule that the electorate called a halt and elected officials who know the basis of good business and prosperity.

Industry had found profitable operation difficult under the restraints imposed by an administration ruled by the labor barons, and the state gained a bad name.

Now that this incubus has been removed the state finds it must undertake the task of overcoming the bad reputation, always a difficult matter. The accomplishments already made indicate a real turnabout and Pennsylvania well may be proud of the progress it has achieved and the response of industry to the effort.

Governor James' statement: "When industry prospers payrolls grow longer and pay envelopes fatter," contains a whole gospel of economic truth which many in high places have failed to learn.

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Education Offers Remedy

To the Editor:

I always read with a great deal of interest the articles in STEEL entitled "Mirrors of Motordom."

I find your article in the Oct. 30 issue very interesting with respect to its comments on the strike situation. I am particularly impressed by the statement that the present labor situation in the motor industry has prompted some executives to wonder if it would not be a good idea to conduct educational courses on the operation of business and industry. This, I feel, is the crux of a great deal of our industrial strife and I have said for some time that if business generally would give more enlightened leadership, many of our problems would never have arisen. If out of this present strike situation a broad movement for industrial education develops, the price will have been a small one.

T. RAY GAITHER

Calvert building,
Baltimore.

More About Iron Buildings

To the Editor:

Mary Willis Shuey presented an interesting phase of the early iron business in the South in her description of plans for utilizing this material for outside surfaces as well as supporting members of public buildings. (STEEL, Nov. 6, p. 17.)

There is in Milwaukee, or was until recently, at any rate, what was known as the Iron Block, in which cast iron panels and pilasters formed the entire exterior of a business block of three or four stories.

In the South, particularly in New Orleans, large use was made of cast iron balcony railings and ornamental openwork porch pillars in the older sections, many of which survive and give an unusual charm to the streets.

This influence was carried north along the Mississippi and Ohio rivers, then the arteries of travel, and in many southern Ohio cities examples are still to be seen on older mansions. Probably breaking out of the Civil war caused diversion of iron to other uses and after the end of that conflict new architectural habits had been formed.

ARCHITECT

Cincinnati

Fire Under This Smoke?

To the Editor:

Increasingly one appears to detect "smoke" from the subject of dry-iron metallurgy or low-temperature reduction of ores of iron.

First it comes as sponge iron, then as granular iron and finally as powdered iron.

Again, we note from time to time the arrival of a sizable batch of Swedish sponge iron, which brings a fancy price from some purchaser, somewhere.

One can learn in a high school laboratory, these days, that a pound of carbon will deoxidize enough iron ore to make 3¼ to 3½ pounds of virgin iron and that the reaction proceeds rapidly, at from 800 to 900 degrees Centigrade.

If there is added another pound of carbon, for heat, we would have the same weight of iron from two pounds of carbon, or, roughly a ton of metallic iron from 1250 pounds of carbon.

They say they burn the carbon with the oxygen of the ore and do it in suspension, just as we now burn coal most efficiently.

If all this smoke portends fire, then the plight of blast furnaces and open-hearth furnaces may be analogous to the experience of the negro at his hanging to which the public and movie cameras were admitted. When the trap was sprung the rope broke and the negro hit the ground standing up.

Excitedly he said: "Hey, you white folks—you keep on foolin' with this movin' picture business, somebody's goin' to git hurt."

Does all this persistent smoke really mean anything?

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